QUEENSLAND AGRICULTURAL JOURNAL

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Agriculture.

CEREAL CROPS.

WHEAT.

THE SOIL.

We know that all soils are not alike—all do not contain the same plant food. If you were to sow wheat in pure sand, or potatoes on stiff yellow clay, you could not expect to get a good crop of either. For a wheat crop, the most suitable soil is one containing a certain amount of clay, constituting a clayey loam. Light calcareous soils with a due proportion of clay are also suitable. Wheat is a crop which, all over the world, gives the best results on strong soils—*i.e.*, those having a considerable admixture of clay. On this account, deep, argillaceous soils, having a large proportion of humus, combined more or less with sand or gravel, are commonly known as "Wheat Lands." Nevertheless, wheat is often successfully grown upon sandy and alluvial soils, and in Queensland on the red volcanic soils common in nearly every part of the State. This, however, is always true: Wheat can only be grown systematically—that is, as a branch of general farming—upon land that is either naturally or artificially in high condition. Wheat makes heavy demands upon the soil, and takes from it its best and most precious constituents. The red, volcanic soils owe their great value as farming lands, not so much to their intrinsic fertility as to physical qualities. They are nearly always very deep, well-drained, and their ultimate particles exist in the form of an almost impalpable powder. They are as excellent for wheat-growing as they are for lucerne and sugar-cane.

The presence of lime in the soil is necessary for the production of good wheat crops and other cereals, such as barley, oats, maize, &c. Since wheat is a deep-rooting plant, it is essential that the land be deeply ploughed. In times past this was not considered necessary on some of the farms on the Darling Downs, but the practice of sowing on land barely scratched with the plough has long since been abandoned. On our western plains, where there is a sparse rainfall when the crop most requires the aid of moisture, deeply prepared soil is needed, as well as deep cultivation. But loose tilth is not required, as the wheat crop flourishes in a firm seedbed. Rolling may be done directly after harrowing or when the crop is beginning to cover the ground. It helps to firm the surface, levels down clods, and presses the earth about the roots of the plants. But rolling should only be done in dry weather, as the soil in wet weather adheres to the roller. The effect of rolling is to promote the growth of the crops and to facilitate harvesting operations. Again, the plant cannot grow if the soil does not support it in a fixed position, while the effects of alternating rainy and dry weather are to draw the soil away and to destroy that close relation between soil and plant which is necessary for the process of vegetation. The roller counteracts this loosening effect and restores the required close contact between soil and stem, and between soil and roots, and this is especially important for the wheat crop during its growth, and also in the matter of facilitating the harvesting by levelling the ground.

SEED.

The selection of seed is a most important matter—in fact, it may be said it is *the most important* operation in wheat-growing. In this connection, the Department of Agriculture and Stock has greatly assisted the farmer, both by importing the best varieties of seed wheat for them and also by breeding wheats at the Roma State Farm which have given excellent results.

If a farmer wishes to grow his own seed wheat, he should study the methods adopted at the State Farms, and, in a general way, proceed in this manner:—

Sow the seed on a specially prepared plat of, say, 1 acre, more or less, according to the size of the farm, and the quantity of land proposed to be put under wheat. Plough the plat early. Get it into the best possible condition, and keep it in a high state of fertility. When the wheat is in ear, go through the field and pick out and mark plants which show the qualities it is desired to perpetuate. Choose those which are well stooled, and whose heads are filled with plump grain. The straw should stand up well, and, as much as possible, be free from rust. When the wheat is ripe, cut these marked plants with a sickle, and thresh them out separately. Then, carefully screen the seed; pick it over by hand and save only the largest and plumpest grain for sowing. Next season sow the seed thus saved at the rate of 35 to 40 lb. per acre. Do the same every year, and it will be found that the wheat, so far from degenerating, will improve. It is well to locate the seed plat on a different part of the farm every year.

SMUT AND BUNT.

Before sowing for a crop, the wheat seed must be treated in a certain manner for the prevention of smut, a fungoid disease which, unless combated, will often cause the loss of half the crop. It attacks wheat, oats, barley, rye, and many grasses. When wheat is affected, the ears are seen to be covered with a dark powder, the floral organs and their coverings are destroyed, and in their place is a mass of dark, chocolate-coloured powder, consisting of small spores. Before harvest time these blow away, and settle on the healthy ears, and remain there till seed-times, when the disease again appears.

Bunt is another fungoid disease which attacks wheat. It differs somewhat from smut, for which it is often mistaken. The evil effects are not seen till harvest time, when, if an apparently healthy ear is opened up, it will be found to contain nothing but a greasy, evil-smelling mass of black spores. If bunted grain be mixed with healthy grain, the effect is that the whole is blackened and rendered practically unsaleable.

These spores of smut or bunt remain on the wheat after it is threshed, and unless precautions are taken they will be sown along with it, and the crop will, to a certainty, be bunted or smuted. There are at least two methods adopted whereby the smut spores are destroyed. One way is to pickle the seed it is intended to sow in a solution of sulphate of copper—1 lb. of sulphate of copper in 5 gallons of water, which quantity will steep 4 bushels of wheat. The wheat may be either put into a gunny bag, which is dipped into the solution and then allowed to drain. Or, the grain may be spread out on a smooth floor, and the solution poured over it, turning it once or twice with a shovel, but this is a very wasteful way. If the dipping plan is adopted, only a minute or two is necessary for the process, in the case of a bluestone solution, on account of its corrosive action. The seed is then spread out to dry, and, if left in a thin layer over night, it is ready for sowing in the morning. The copper will have formed a thin film on the seed, which effectually destroys the smut spores which may be adhering to it, without injury to the grain.

The second method is to treat the seed with a solution of formalin at the rate of 1 lb. of formalin to 40 gallons of water, but in this case five minutes are allowed for dipping. Both methods are equally efficient. The bluestone solution may be used again and again, but the formalin is volatile, and it follows, therefore, that only the amount of formalin should be prepared that is required for immediate use, and sprinkling in this case should be preferred to dipping. Formalin is poisonous, and must be kept where there is no chance of children or others obtaining it in ignorance of its nature. One gallon of formalin solution is sufficient for 4 bushels of seed.

RELATIVE MERITS OF FORMALIN AND BLUESTONE.

In comparing the two solutions of formalin and bluestone, it must be remembered that, as above stated, formalin is volatile and non-corrosive, while bluestone is very corrosive. The original formalin solution must be kept securely corked. The cost of either is practically

the same, and the formalin is less injurious to the grain than bluestone. The corrosive action of bluestone can be lessened by dusting powdered lime over the grain immeditely after treatment, but this prevents sowing with the drill. The destruction of a certain proportion of the seed grain is not an unmixed evil, because it will act most injuriously on those grains already somewhat damaged, and which are consequently most likely to produce a weakened plant.

The Hot Water Treatment.

In addition to the above methods of "pickling" wheat seed, the "Hot Water Treatment" may be mentioned. For this purpose, either boilers or washtubs may be used. Two of these are required, also, a basket or, as before, a gunny bag. The latter is filled to three parts of wheat; then one of these is filled with water treated to 120 degrees Fahr., and the other with water heated to 135 degrees Fahr. A smaller vessel containing boiling water should be at hand, also a good supply of cold water. The seed to be treated is placed in a basket, gunny bag, or in a perforated kerosene tin. The vessel containing the seed is plunged into the first tub or boiler (120 deg. F.), and is moved about for a minute or two till the grain has all been warmed, lifting and lowering it several times meanwhile. A thermometer should be at hand to test the heat of the water, which must not be allowed to go lower than 120 deg. F. Then it is plunged into the second tub or boiler, in which the water has been heated to 135 deg. F. There it is left for ten minutes, and constantly moved about to agitate the grain. Should the temperature fall below 135 deg. boiling water must be added. The vessel containing the grain is then taken out and plunged into cold water, after which the grain is spread out on the barn floor to dry, when it will be ready for sowing.

Preparation of the Land.

The preparation of the ground for a wheat crop is very simple, yet there are still farmers who do not take any trouble to prepare the ground in such a manner as to ensure a fair crop. In some cases, they merely scratch the soil with the plough, and even, in the past, did not go beyond harrowing the seed into unploughed land. Wheat land should have two ploughings to a depth of at least 6 inches. In the United States of America, certainly, experiments in deep and shallow ploughing for wheat showed that the depth of ploughing is not of so much importance as a firm seed-bed, the upper portion of which is mellow and in good tilth, subsoiling not being considered financially profitable. Such shallow ploughing, however suitable it may be for the wheat-growing States of America, is not calculated to produce the best results in the climate of Queensland. After the first two ploughings, a first harrowing should follow and the ground be got into the best possible condition before sowing. In sowing, this may either be done broadcast or, as is now universally done, by a seed-drill. In sowing broadcast, one bushel per acre is more than sufficient. With a seed-drill 20 lb. is ample. Many farmers sow too much seed. Take the instance of 1 bushel to the acre. Fair average seed will run 800 grains, and good plump seed 700 grains to the ounce, so that a bushel of 60 lb. contains 750,000 grains. In a square acre there are 4,840 square yards, or 43,560 square feet. Thus,

a bushel to the acre means from 15 to 18 seeds per square foot. Say that one-quarter of this fails to germinate, being partly eaten by birds, partly insufficiently covered, yet we still have from 12 to 14 plants per square foot—that is, just twice as many as there should be. A seed-drill is generally constructed to sow from 35 to 40 lb. per acre, and, since the seed is all properly covered, there will be nearly as many plants per acre as with a bushel sown broadcast. What is the result of this crowding of the plants? They have to fight each other for moisture and plant food, and thus become stunted and do not stool out properly. Far better, then, to drill in only 20 lb. of seed per acre.

Now, about harrowing after sowing. The harrowing should be done crosswise to the direction in which the land was ploughed. The work will thus be more effective, and it will be better for the crop. Rolling the wheat, even when it is a foot high, is also productive of good. The rolling prevents "lodging" by consolidating the soil, and thus, by decreasing its power to supply overmuch nitrogen to the plants, results in the production of a less luxurious plant, with roots which have a firm hold of the consolidated soil. In this way the danger of lodging is avoided.

Should the great enemy of wheat—rust—make its appearance, it is well not to be in too great a hurry to cut the crop for hay, as it is quite possible that a really good grain crop may be sacrificed. Should the rust, however, unfortunately go too far, then, by all means, cut it, for it will pay as hay, whereas it will be worth nothing for grain.

The best time to sow wheat in the Southern part of the State is from April to June. March is considered the best time farther North. If early sowing is necessary, sow thin; if late, sow thicker.

LIME IN AGRICULTURE.

The use of lime in agriculture is of more importance than is recognised by many farmers. If there is no lime in a soil, no crop can thrive on it, as all plants require more or less of it. Lime acts in two ways. It is not a direct fertiliser, but it acts with acids in making clay soils more friable and pervious to water, and it promotes the decomposition of vegetable matter and organic manures, and the formation of nitrates in the soil. It also acts in rendering available all three of the plant foods which lie dormant in the soil. That is its chemical action. Its physical action, as we have said, is to render stiff clays easier to cultivate, and better able to supply moisture, heat, and air to the plant. It improves the texture of sandy soils, making them more compact, and better able to retain moisture and fertilisers. The time to apply lime is a little while before planting a crop. It should not be ploughed in. It is of great value in destroying insects, worms, and fungi. As to how much to use, some farmers put on from 2 to 5 tons per acre at intervals of from five to ten years. Others put on half a ton annually.

Lime may be applied in the form of burnt lime or air-slaked lime, but pulverised limestone has several advantages over these forms. Much inquiry has been made by farmers as to supplies obtainable and prices

of ground limestone, and the Department of Agriculture invited a number of firms in a position to supply the demand to quote prices for pulverised and burnt limestone.

The firms communicated with were the undermentioned:—

Messrs. Campbell and Amos, Bundaberg.
The Calcium Lime Quarries, near Townsville.
Chillagoe Limited, Cairns.
Australian Co-operative Fertilisers Company, Degilbo.
Mount Morgan G.M. Company.
Queensland Cement and Lime Company, Creek street, Brisbane.
The Proprietor, Ambrose Quarries, N.C. Line.

Four of these firms replied, and gave the following quotations:—

—	Ground Limestone. Per ton.	Burnt Limestone. Per ton.		
	In Bags – (Truck loads).	In Bags.	In Tanks.	
	£ s. d.	£ s. d.		
The Queensland Cement and Lime Company	1st year 1 0 0	2 15 0	..	On trucks at Gore. (Freight, Gore to Brisbane, 8s. per ton). These prices subject to reduction later.
Australian Co-operative Fertilisers Co.	2 5 0 (In 6-ton truck loads)	..	..	
Campbell and Amos..	..	1 10 0	..	Bags returnable at 3s. per dozen
Mount Morgan Gold Mining Company	0 17 6 In truck loads at Marmor, cost in Gympie, 28s. 6d., Brisbane, 32s. 11d.	..	£1 7s. 6d. net.	Bags returnable, at 3s. per dozen on rails, Raglan.

A reply has since been received from Mr. H. Ambrose (Ambrose Quarries), quoting burnt lime on trucks at 35s. per ton in bags, the latter to be returned or allowed for. Lime f.o.b. Rockhampton, £2 2s. 6d. per ton in tanks, the buyer to provide tanks, or the company will supply and charge for them.

SEVENTY BUSHELS OF OATS TO THE ACRE.

THE "LIFTER" OAT.

Mr. W. H. Mogridge, Tannymorel, writes us in reference to a valuable variety of oats, called the "Lifter," the seed of which he obtained last year from South Australia. He speaks very highly of this new variety, of which he has seed for disposal. The "Warwick Examiner" of 21st March, contains a very interesting article, giving the history of this oat, taken from the "Adelaide Chronicle," as follows:—

"In the Myponga district this year some of the finest crops in Australia may be seen at the present time, and yields of 4 tons of hay per acre will be a common harvest. Mr. G. Hunt, of Myponga, has

what is described as one of the crop pictures of the year. It is a field of oats, from which a return of nearly 70 bushels per acre is confidently expected. Some years ago Mr. C. Forbes, of Yankalilla, imported from America a small sample of oats, which had produced wonderful crops there, and in characteristic fashion the American seedsman who supplied the sample pointed out in the printed particulars forwarded with the parcel that all who had so far planted this variety of oats had in a year or two ' lifted their mortgages' from the proceeds. Mr. Forbes dispensed the seed in small lots at the rate of about a shilling an ounce, and the enterprising farmers who obtained samples have reason to be grateful to the importer, for the new strain has yielded enormous crops on every farm on which it was planted. The process of raising enough to sow paddocks has been slow, but the corner in that respect has been rounded, and the grain will soon be found in other parts of the State. Mr. Hunt was one of the purchasers of the shilling packets about six years ago. He planted every seed—there were about sixty—and carefully harvested the crop, the result being about a gallon of splendidly-developed grains. In the following year he gathered about 1½ bushels of grain, and sowed the whole of it the next season. So prolific was the crop that he harvested at the rate of 64 bushels to the acre. With this 64 bushels in the succeeding year he planted 15 acres, and the portion reserved for grain yielded 50 bushels to the acre. This was last year, when the drought was so bad. Eight of the 15 acres were cut for hay, the balance of 7 acres giving him 151 bags of first-class seed. This year he has 80 acres under crop in different paddocks, and he expects to harvest at least 1,000 bags, in addition to cutting hay. The ' picture' crop consists of 9 acres, which stands fully 7 ft. in height. It is by far the best specimen of a crop seen this season, and Mr. Hunt says it will give nearly 70 bushels to the acre. In another paddock he has 16 acres that is about 6 ft. high, and will give over 3 tons of hay, or about 60 bushels of grain per acre. Still another fine crop, nearly 6 ft. in height, covers 27 acres, and a fourth paddock of 30 acres, which was sown later, is not out in head yet, although over 5 ft. high. Mr. Hunt's nephew at Myponga (Mr. J. Hunt) has 8 acres of the American oats alongside a field of Algerian, and the two are described as the best crops over seen in the Southern Hemisphere. These magnificent returns are the result of a shilling investment six years ago, and as the growers have lost the name of the oats received from the seller, they have appropriately given the variety the title of ' Mortgage Lifter.' ''

FLAX-GROWING FOR FIBRE.

In the February issue of the Journal, we published some notes on growing flax for seed (linseed). Concerning the cultivation of the plant for the sake of the fibre, Dr. J. Vargas Eyre writes as follows in '' The Times Trade Supplement'':—

'' From the agricultural point of view no difficulty is experienced in raising flax as a fibre crop, the choice of suitable land being moderately wide. The matters of greatest consequence are that the land be clean and well prepared, and that good seed be sown. It is a crop which grows rapidly, and when sown in March or early April comes to harvest before the usual grain crops. The value of the crop when grown for fibre purposes depends largely upon the manner in which it is harvested.

The stems must be arranged parallel with one another in neat bundles, and up to the present day this is done by pulling the stems from the ground by hand—an operation which is both strenuous and costly to perform.

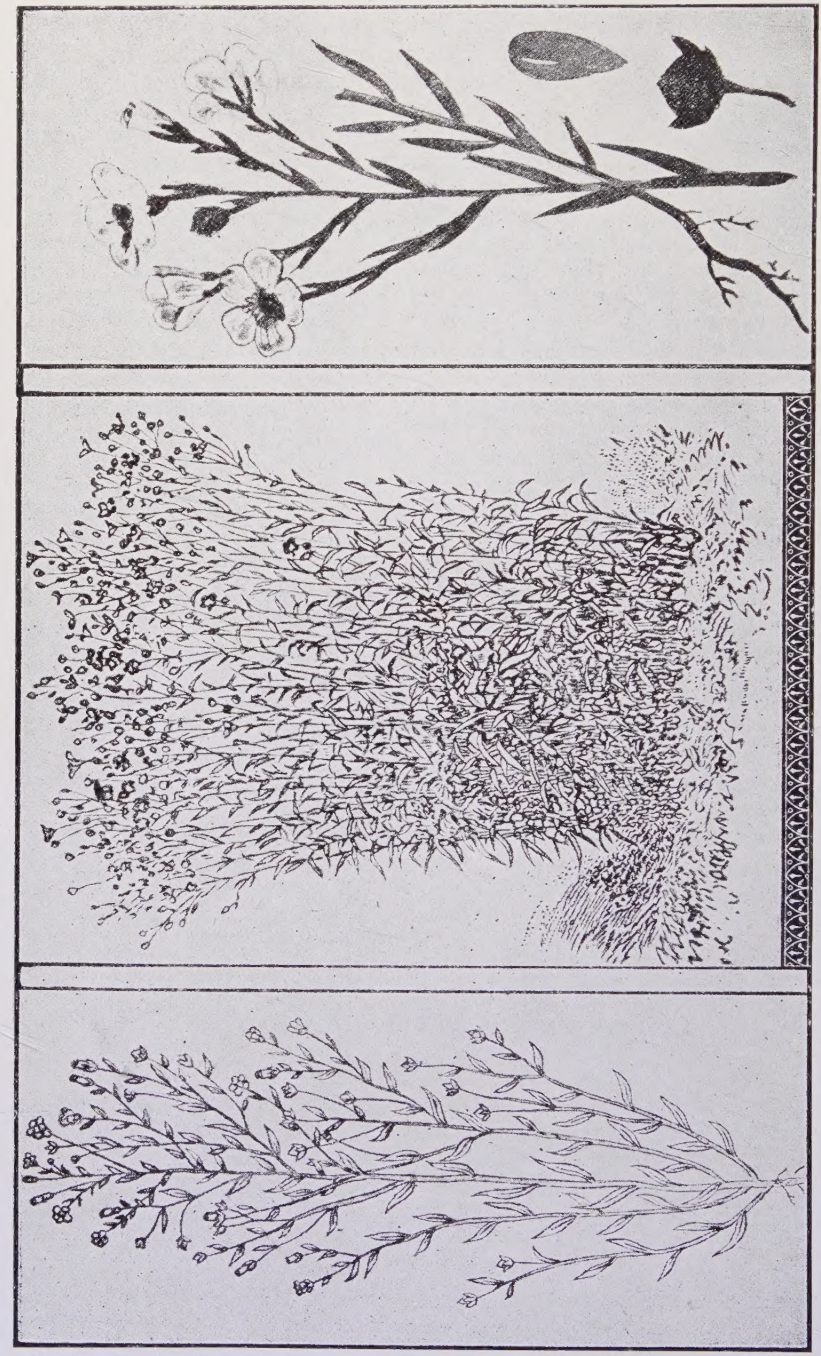

PLATE 12.—FLAX PLANT (LINUM USITATISSIMUM).

FIG. 1.—Flax Grown for Seed.

FIG. 2.—Flax for Fibre.

FIG. 3.—Flax Plant.

"After drying in the field for a few days, the seed is removed by some simple device which does not disarrange the long flax stems, and the straw is then ready for the operations necessary for separating the fibre from the straw. The valuable part of the straw—namely, the fibre—is situated almost on the outside of the stem, where it forms a series of irregular groups or bundles running longitudinally, which are held in position by a gummy or resinous material. Before the harvested straw can be utilised by the spinner in the customary way, these bundles of long fibres have to be isolated, and notwithstanding the large number of processes which have been devised for accomplishing this separation, the most satisfactory method is to allow the stems to damp-rot, a process which is known as *retting*.

METHODS OF RETTING.

"From the earliest times to the present the process of retting has been conducted either by submerging the flax stems in water or by allowing alternate dew, sunshine, and rain to carry forward the decomposition of the gum so that the fibre may be readily detached from the woody part of the straw. These operations, known respectively as water-retting, or steeping, and dew-retting, are still the most usual and most satisfactory means to adopt, and, as carried out to-day in the principal flax-growing districts of Europe, present little departure from the methods adopted in medieval times.

" Dew-retting is the simplest of all methods of retting which have been devised, as it only necessitates spreading the straws thinly over the ground in regular rows, where they are allowed to remain for about six weeks, during which time they are occasionally turned over. As might be expected, the fibre resulting from this treatment is generally discoloured and low in quality; nevertheless, enormous quantities of dew-retted flax are annually prepared in Russia, Austria-Hungary, and other countries.

" The other method of retting referred to—namely, water-retting, as practised in Ireland, Russia, Silesia, France, and parts of Holland and Belgium—is still conducted on primitive lines. The bundles of straw are packed closely into pits containing water, a light covering of straw or leaves put on the top, and upon this a suitable weight of stones is arranged so as to keep the whole mass submerged during the retting period. During summer weather the usual time for steeping flax is from ten to twelve days, and when the adjudged point has been reached the straw is removed and either spread over grass land or opened out and stood upon end to dry.

" In certain districts a somewhat different practice obtains. For instance, in the south of Holland and East Flanders the bundles of flax are kept submerged in the water by covering the entire mass with mud, whilst in Friesland the bundles are merely floated upon the surface of the water and are frequently turned over. There can be no doubt that the best flax fibre comes from the neighbourhood of the River Lys, near Courtrai, where the practice is followed of twice submerging the straw in the river—a method known as double-retting or Lys-retting. For the production of high-class fibre this method stands before all others which up to the present have been tried. It is a practice which originated in the neighbourhood of Courtrai about the middle of last century, soon after it had been discovered that retting is primarily a fermentation process.

"The Belgian workers have undoubtedly acquired remarkable skill and judgment in retting and handling the wet stems, but it is probable that their singular success is to be attributed in some measure also to the character of the River Lys, to its sluggish movement, to the organic matter it carries from towns higher up its course, and to the fact that large quantities of flax are annually retted in its waters.

"Following the retting process, the flax straw is carefully dried, then passed between fluted rollers so as to break up the brittle woody part of the stems and leave the long, more elastic fibres uninjured. These are then freed from the loosely adhering broken pieces of stem by a beating process which is known as *scutching*, now performed by machinery so devised that the old-fashioned hand-beating with flat wooden blades is reproduced."

RHODES GRASS AT YALLEROI.

We have received from Mrs. J. Adams another photograph of the remarkable crop of Rhodes Grass grown at Henley Park, and mentioned in the April issue of the Journal. The grass, we are informed, was

PLATE 13.—RHODES GRASS GROWING ON HENLEY PARK, 19TH MARCH, 1917; HEIGHT, FIVE FEET.

grown on unploughed land, the seed being scattered on the surface just before the spring showers. It is now 5 ft. high and spreading fast. It is grown in desert country.

Pastoral.

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—BEEF AND DAIRY CATTLE.

The following revised list of breeders of purebred cattle is published for the purpose of informing those who desire to improve their stock where the best cattle can be obtained in the State. The Department of Agriculture and Stock takes no responsibility in relation to the entries in the list; but, when inquiries were first made, the condition was imposed that the entries were to be only of stock that had been duly registered, or that were eligible for registration in the different herd books. The entries received were, in some cases, somewhat too confusing for proper discrimination, it has, therefore, now been decided that only such cattle as have been registered will be included. The lists previously published in the *Queensland Agricultural Journal* have now been withdrawn for revision.

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
P. Young	Talgai West, Ellinthorp	2	42	Milking Shorthorn Herd Book of Queensland
L. H. Paten	"Jeyendel," Calvert, S. & W. Line	8	21	Ayrshire Herd Book of Queensland
F. C. G. Gratton ..	"Towleston," Kingsthorpe	2	14	Holstein Cattle Club Herd Book
T. Mullen	"Norwood," Chelmer	3	20	Queensland Jersey Herd Book
J. H. Paten	Yandina	6	21	Ayrshire Herd Book of Queensland
Queensland Agricultural College	Gatton	2	6	Ayrshire Herd Book of Queensland
		2	3	Holstein-Friesian Herd Book of Australia
		3	13	Jersey Herd Book of Queensland
J W. Paten	Wanora, Ipswich ..	10	42	Ayrshire Herd Book of Queensland
M. W. Doyle	Moggill	4	12	Queensland Jersey Herd Book
G. A. Buss	Bundaberg	1	15	Herd Book of the Jersey Cattle Society of Queensland
W. Rudd	Christmas Creek, Beaudesert	2	10	Milking Shorthorn Herd Book of Queensland
M. F. and R. C. Ramsay	Talgai, Clifton ..	5	27	Herd Book of the Jersey Cattle Society of Queensland
George Newman ..	Wyreema	9	37	Holstein-Friesian Herd Book of Australia
R. Conochie	Brooklands, Tingoora	9	21	Queensland Jersey Herd Book
W. J. Barnes	Cedar Grove ..	10	37	Queensland Jersey Herd Book
T. B. Murray-Prior ..	Maroon, Boonah ..	2	37	Queensland Shorthorn and Australian Herd Books
W. J. Affleck	Grasmere, N. Pine ..	6	31	Queensland Jersey Herd Book

Poultry.

FINAL REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, APRIL, 1916, TO MARCH, 1917.

The thirteenth egg-laying competition at the Queensland Agricultural College was brought to a close on 31st March, 1917. In all, 438 birds were subjected to the year's test, 318 in groups of six, while 120 were tested individually. Last year the single-hen test was introduced for the first time in the Gatton competition, and the results obtained fully justify the innovation. In truth, the group testing has to a great extent served its purpose. It merely indicated the general quality of the competitors' flocks, and while this is certainly of value in letting the general public know where poultry of quality can be obtained, it does not serve any considerable purpose in indicating the qualities of the individual hen. But rapid improvement in stock can only be secured by mating together the individual best, and it is because the single-hen test finds the best individual layers that it is so important. Analysing the results of the single test, it is very significant that the Dixie Egg Plant should have entered five splendid layers who averaged 279 eggs per bird, while the sixth hen proved to be quite barren. In other cases considerable variation in the egg-laying capacity of individual birds is shown, while for such breeders as Miss Hinze, T. Fanning, J. Zahl, J. M. Manson, A. T. Coomber, and J. H. Gill, the test has proved of exceptional value in indicating the uniformity of their stock. It is the desire of the College authorities to replace all the six-hen pens with single-hen pens, and it is hoped that the Government will recognise the importance and value of such a move. At present money may not be available for such a reconstruction, but it is anticipated that this work will be carried out at the first opportunity. In regard to this, it cannot be forgotten that both in New South Wales and Victoria they have recognised the necessity of single hen testing only, and have dispensed with their group pens. Further, primary industries are destined to play a most important part in the Empire's recovery after the war. In no way can that section of primary production, egg production, be assisted better than by promoting ample facilities for single hen testing, so that the general efficiency of the flocks may be improved.

GENERAL DISCUSSION OF RESULTS.

Although in the past competition no records were broken, it is particularly interesting to note that four pens reach or exceed a total of 1,500 for six hens, while ten exceeded 1,400. On the other hand, a greater number than was expected fell below 1,200. As a result of the whole, the average per hen works out at 209·7 eggs. This is lower than any competition at the College for the past five years. In part, this can be explained by the fact that the number of competitors was increased

by 20 pens, and probably younger or less experienced breeders were admitted, but the main cause was the weather conditions. The heavy egg-producing months were characterised by excessive rains, as shown by the following table:—

	Rainfall in Inches.	Number of Rainy Days.
1916—		
April	4·83	10
May	·30	2
June	1·95	9
July	1·57	5
August	1·79	6
September	1·84	6
October	2·93	9
November	4·96	11
December	2·63	10
1917—		
January	4·81	14
February	4·01	8
March	2·97	10

In examining the general results below, it is significant to note that the five leading teams were tested in single pens, and that all of them were owned by Queensland breeders, thus indicating a very high and uniform standard of egg production in some of our yards.

HEALTH OF THE STOCK.

During the year nineteen birds died—one from heat apoplexy, six from crop troubles following chicken pox, and twelve from ovarian disorders. During the year we had 471 cases of broodiness: one pen of six hens had 40 cases; others, 33, 28, 28, 23, 22, 22, 20, 18, 12, and down to 1 respectively.

FINANCIAL ASPECT.

Although it is difficult to draw definite financial conclusions from an egg-laying competition such as this, still it is of very considerable interest to see how the cost of feed compares with the net returns for eggs. Naturally, the cost of labour cannot be entered; for in a competition labour and supervision are far in excess of what is required in a commercial enterprise. Further, the cost of rearing pullets to the laying stage cannot be included, but this item can be practically cancelled, inasmuch as the sale of cockerels as table birds should cover this expenditure. Referring to the financial statement below, and neglecting the entry fees received and prize money paid, we have the average return per bird as 18s. 8d., and the average cost per bird for feed only 6s. 2¾d., giving an average profit per bird of 12s. 5¼d. Obviously this profit is much larger for the top pens than for the lower. Also, the returns shown scarcely indicate the relative values of each pen, as those which laid heavily during the winter months, or at times when eggs were dear, returned a higher profit than those which laid heavily during the flush season. It is hoped to keep records during the coming competition as will give these details.

A NOTE OF WARNING.

During the competition careful weighings of eggs were carried out, with the following results:—

RESULTS OF WEIGHING EGGS FROM SIX HEN PENS.

Competitors.	Breed.	Average Weight per Egg.	Competitors.	Breed.	Average Weight per Egg.
		Oz.			Oz.
A. T. Coomber ...	S. Buttercups	2·10	H. Hammill ...	W. Leghorns	2·00
P. Brodie	W. Leghorns	2·00	W. Lindus ...	Do. ...	2·00
S. B. Tutin ...	Do. ...	2·00	Mars Poultry Farm	B. Orpingtons	1·85
J. Anderson ...	Do. ...	2·15	F. Clayton ...	W. Leghorns	1·90
T. Taylor	Do. ...	1·95	Moritz Bros. ...	Do. ...	2·05
G. Tomlinson ...	Do. ...	1·90	A. F. Camkin ...	Do. ...	1·90
E. F. Dennis ...	B. Orpingtons	1·80	W. Becker ...	Do. ...	2·00
F. Clayton ...	R. I. Reds ...	1·95	E. F. Dennis ...	W. Wyandottes	1·60
Mrs. C. Davis ...	W. Leghorns	1·95			
J. G. Richter ...	Do. ...	1·90			
G. H. Turner ...	Do. ...	2·00	Harveston Poultry Farm	W. Leghorns	2·00
E. Pocock	Do. ...	1·95			
H. Jobling ...	B. Orpingtons	1·80	W. Purvis ...	Do. ...	1·95
H. W. Board ...	W. Leghorns	1·90	W. Lyell ...	Do. ...	1·95
F. W. Leney ...	Do. ...	2·05	R. Burns ...	B. Orpingtons	1·90
W. Meneely ...	Do. ...	1·90	A. Howe ...	W. Leghorns	1·95
J. R. Wilson ...	Do. ...	1·90	L. K. Pettit ...	Do. ...	2·00
T. Fanning ...	B. Orpingtons	1·80	Mrs. Bradburne	Do. ...	2·00
Cowan Bros. ...	W. Leghorns	2·10	W. Hirst ...	Do. ...	1·95
A. H. Padman ...	Do. ...	2·00	R. Burns ...	S. L. Wyandottes	2·00
J. M. Manson ...	B Orpingtons	1·70			
Mrs. Munro ...	W. Leghorns	2·00	T. B. Hawkins...	W. Leghorns	2·05
Geo. Prince ...	Do. ...	1·90	Cowan Bros. ...	B. Orpingtons	1·95
W. H. Forsyth ...	B. Orpingtons	1·95	Dr. Jennings ...	W. Leghorns	1·95
King and Watson	W. Leghorns	2·05	T. E. Jarman ...	Do. ...	2·15
Mars Poultry Farm	Do. ...	2·05	J. Gosley ...	Do. ...	1·90
A. W. Bailey ...	Do. ...	1·95	Kelvin Poultry Farm	Do. ...	1·85
G. W. Holland ...	Do. ...	1·95			
F. W. Leney ...	R. I. Reds ...	1·95	C. P. Buchanan	Do. ...	2·55

SINGLE HEN TEST RESULTS. (Oz.)

Competitors.	Breed.	A.	B.	C.	D.	E.	F.	Average.
J. Zahl	W. Leghorns	2·15	2·15	2·00	2·05	2·00	1·90	2·04
Dixie Egg Plant ...	Do. ...	1·95	1·95	2·05	1·95	...	2·05	1·99
J. H. Madrers ...	R. I. Reds ...	2·00	2·10	1·90	2·30	2·05	2·35	2·12
A. E. Walters ...	W. Leghorns	2·05	2·00	2·20	1·95	1·95	2·05	2·03
W. H. Knowles ...	Do. ...	2·05	1·90	2·05	2·00	1·85	2·15	2·00
Mrs. Jobling ...	B. Orpingtons	1·90	1·95	2·15	2·00	1·75	1·85	1·93
C. Knoblauch ...	W. Leghorns	2·10	1·95	2·05	1·90	1·90	1·95	1·98
J. F. Dalrymple ...	R. I. Reds ...	2·00	2·20	2·00	2·25	2·25	2·25	2·16
J. M. Manson ...	W. Leghorns	2·10	2·20	2·30	2·25	2·25	2·00	2·18
Miss Hinze	Do. ...	2·05	2·30	2·25	2·00	2·10	2·05	2·13
E. F. Dennis ...	Do. ...	2·15	2·10	2·35	1·90	2·10	2·25	2·14
Kelvin Poultry Farm	Do. ...	2·00	1·80	2·05	2·20	1·90	2·10	2·01
E. A. Smith	Do. ...	2·00	2·05	2·25	2·15	2·30	2·05	2·13
J. W. Macrae ...	B. Orpingtons	2·05	1·60	1·95	2·10	2·00	2·00	1·95
T. Fanning	W. Leghorns	2·05	2·10	2·05	2·05	2·00	1·95	2·05
J. H. Gill	Do. ...	2·05	1·90	2·10	1·95	1·80	2·00	1·97
J. Anderson	R. Sussex ...	1·95	2·05	2·00	2·00	1·60	2·00	1·93
A. T. Coomber ...	W. Leghorns	2·05	2·10	1·95	1·95	2·20	2·05	2·05
E. West	Do. ...	2·00	2·25	2·20	2·00	2·00	2·40	2·14
W. L. Forrest ...	Do. ...	2·05	2·10	2·35	1·95	2·15	1·95	2·09

RESULTS OF SINGLE HEN TEST.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
Miss Hinze	266	223	289	241	270	253	1,542
T. Fanning	275	266	272	261	227	229	1,530
J. Zahl	258	270	216	262	259	251	1,516
J. M. Manson	224	276	239	242	276	243	1,500
A. T. Coomber	263	271	243	231	231	236	1,475
E. A. Smith	255	269	239	265	199	183	1,410
J. H. Gill	214	237	238	267	212	227	1,395
W. H. Knowles, junr.	201	233	238	202	261	245	1,380
Dixie Egg Plant	291	269	265	269	...	260	1,354
J. F. Dalrymple	198	236	236	196	265	213	1,344
A. E. Walters	241	275	229	203	239	200	1,387
E. F. Dennis	200	237	184	265	233	200	1,319
Mrs. Jobling	211	276	197	202	194	208	1,288
E. West	234	235	206	205	189	201	1,270
C. Knoblauch	191	235	223	189	205	224	1,267
W. L. Forrest	240	237	62	185	255	234	1,213
Kelvin Poultry Farm	193	167	159	194	266	174	1,153
J. H. Madrers	150	223	224	215	165	176	1,153
J. W. Macrae	157	232	214	222	148	170	1,143
J. Anderson	202	166	232	114	196	167	1,077

In these weighings every care was taken to secure at least six eggs from each pen when the birds were in full lay. Because of possible errors, a 5 per cent. margin was allowed. Hence eggs ranging on the average from 1·90 oz. and upwards were allowed. It is significant that some of the breeds, notably the Black Orpingtons, were generally low. Excessive size of eggs is not required, but the standard of 24 oz. per dozen is in no way excessive, and breeders should aim at this. Another point to be noted is that many competitors sent their birds forward in full lay. This generally results in the birds getting a distinct setback owing to altered conditions. Another point to be noted is that, in the endeavour to breed a strictly utility type, the general good points of many of the breeds are being ruined. Perhaps in no case is this more evident than with Black Orpingtons. In order to prevent this the 1917-18 competition

has been divided into two sections, A and B; A for light breeds and B for heavy breeds. Also, special prizes are to be given for pens which have been declared true to type. Following this, and in imitation of the practice followed in New South Wales, it is our intention to institute certain weight conditions for the pullets of each breed in the 1918-19 competition. This warning is given because we want Queensland breeders to be prepared. Weight, size, and type are not foolish notions. They are indications of stamina, health, and breed which cannot long be neglected without disastrous results to the poultry industry.

ALLOTMENT OF PRIZE MONEY.

	£ s. d.	£ s. d.
Miss M. Hinze—		
First, highest aggregate	7 7 0	
Second, single-hen test	3 3 0	
Monthly prize, September (½)	0 5 0	
		10 15 0
T. Fanning—		
First, winter test	3 3 0	
Second, highest aggregate	4 4 0	
Monthly prize, April	0 10 0	
		7 17 0
Dixie Egg Plant—First, single-hen test		5 0 0
J. Zahl—		
Second, winter test	2 2 0	
Third, highest aggregate	2 2 0	
Monthly prizes, May, September (½)	0 15 0	
		4 19 0
J. M. Manson—		
Third, single-hen test (⅔)	1 8 0	
Monthly prizes, October, March	1 0 0	
		2 8 0
Mrs. J. H. Jobling—		
Third, winter test	1 1 0	
Third, single-hen test (⅓)	0 14 0	
Monthly prize, June	0 10 0	
		2 5 0
Cowan Bros.—Monthly prizes, July and August		1 0 0
J. R. Wilson—Monthly prizes, November and February		1 0 0
C. Tomlinson—Monthly prize, January		0 10 0
E. Pocock—Monthly Prize, December (½)		0 5 0
F. Meneely—Monthly prize, December (½)		0 5 0
Total prize money		£36 9 0

Competitors.	Breed.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Totals.
*Miss M. Hinze, Milton road, Milton	White Leghorns	19	122	122	139	152	160	158	140	146	124	135	125	1,542
*T. Fanning, Ashgrove, Brisbane	Do.	104	124	101	141	133	149	157	122	131	115	140	113	1,530
*J. Zahl, Boonah	Do.	61	132	104	147	143	160	155	133	148	118	105	110	1,516
*J. Manson, Milton road, Milton	Do.	28	96	120	133	151	158	167	141	148	124	102	132	1,500
*A. T. Coomber, Brown's Estate, Bundaberg ...	Do.	64	122	90	126	146	157	159	132	146	128	117	88	1,475
J. R. Wilson, Eudlo	Do.	3	73	122	146	150	155	165	144	153	134	147	70	1,462
Geo. Tomlinson, Boonah	Do.	36	76	113	129	143	149	162	133	152	154	129	64	1,440
G. H. Turner, Aratula	Do.	53	88	113	135	146	151	159	137	142	126	120	68	1,438
W. Meneely, Warwick	Do.	30	100	122	119	145	148	159	137	157	143	124	34	1,418
*E. A. Smith, Paddington, Brisbane	Do.	48	73	93	123	141	149	155	132	146	139	123	88	1,410
*J. H. Gill, Cheltenham, Victoria	Do.	45	51	77	123	140	134	154	132	151	140	122	126	1,395
*A. E. Walters, Bank street, South Brisbane ...	Do.	56	67	93	118	145	148	160	128	141	138	120	23	1,387
A. Howe, Wickham, N.S.W.	Do.	64	90	123	134	149	152	152	111	134	105	103	69	1,386
*W. H. Knowles, junr., Taringa	Do.	26	45	69	130	141	152	154	137	144	137	141	104	1,380
Mrs. J. R. D. Munro, Warwick	Do.	44	86	101	86	137	154	158	130	142	135	115	83	1,372
J. M. Manson, Milton	Black Orpingtons	39	66	103	129	145	156	151	128	142	116	104	87	1,366
Dr. E. C. Jennings, Ipswich	White Leghorns	29	94	117	136	149	144	148	123	140	124	113	45	1,362
*Dixie Egg Plant, Newmarket	Do.	55	115	100	124	130	135	132	117	129	123	88	106	1,354
*J. F. Dalrymple, Rochdale, N.S.W.	Rhode Island Reds ...	24	83	102	117	150	154	136	111	127	124	112	104	1,344
A. W. Bailey, Red Hill, Brisbane	White Leghorns	33	71	110	113	130	145	150	126	144	136	120	64	1,342
Geo. Prince, Grove Estate, Brisbane	Do.	14	71	123	125	134	150	141	129	136	128	110	76	1,337
*E. F. Dennis, Brisbane	Do.	38	90	92	110	141	145	163	135	141	132	83	49	1,319
A. H. Padman, Adelaide, S.A.	Do.	65	52	66	100	133	146	135	127	154	152	118	66	1,314
H. W. Broad, Corinda	Do.	45	54	103	101	147	146	145	128	135	134	113	62	1,313
Cowan Bros., Burwood, N.S.W.	Do.	0	23	85	104	144	147	166	142	152	145	139	57	1,304
Mrs. W. D. Bradburne, Kagarah, N.S.W. ...	Do.	75	50	67	117	147	151	150	137	140	132	100	31	1,297
R. Burns, Sladevale, Warwick	S. L. Wyandottes	3	39	104	143	147	148	143	118	129	124	109	84	1,291
*Mrs. J. H. Jobling, Plattsburg, N.S.W. ...	Black Orpingtons	64	106	125	131	140	155	127	107	85	87	97	64	1,288
E. Pocock, Windsor, Brisbane	White Leghorns	42	20	75	119	129	155	152	136	157	143	103	55	1,286
W. Purvis, Glanville Blocks, S.A.	Do.	6	48	57	126	146	157	164	132	150	128	98	72	1,284
F. Clayton, Blacktown, N.S.W.	Do.	27	58	88	119	132	141	142	127	145	139	116	47	1,281
E. F. Dennis, Brisbane	Black Orpingtons	0	3	97	126	155	160	151	126	136	134	121	71	1,280
T. Taylor, Thompson Estate, South Brisbane ...	White Leghorns	55	41	98	116	140	146	151	139	133	127	101	28	1,275
W. Lyell, Graceville	Do.	49	86	92	111	134	147	145	122	126	133	84	45	1,274
*E. West, Grove Estate, Brisbane	Do.	25	59	100	111	126	148	154	123	128	116	107	73	1,270
*C. Knoblauch, South Brisbane	Do.	41	52	89	121	133	144	144	121	133	126	110	53	1,267
T. E. Jarman, Eastwood, N.S.W.	Do.	62	58	83	114	137	139	148	125	136	127	95	37	1,261
T. Fanning, Ashgrove, Brisbane	Black Orpingtons	13	49	74	121	128	134	154	130	147	130	113	65	1,258
T. B. Hawkins, Redbank	White Leghorns	77	81	82	119	137	141	141	112	119	112	103	37	1,261
King and Watson, St. Mary's, N.S.W. ...	Do.	40	37	71	109	141	143	149	126	130	130	119	61	1,256
P. Brodie, Greenmount	Do.	62	57	86	88	124	141	150	135	142	128	97	45	1,255

Competitors.	Breed.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan	Feb.	Mar.	Totals.
A. F. Camkin, Canley Vale, N.S.W.	White Leghorns	16	61	101	130	133	134	139	119	130	137	96	55	1,251
Cowan Bros., Burwood, N.S.W.	Black Orpingtons	19	19	104	153	157	135	140	116	108	117	99	75	1,242
G. W. Holland, Paddington, Brisbane	White Leghorns	48	33	46	75	117	143	159	136	151	150	125	57	1,240
H. Jobling, Cessnock, N.S.W.	Black Orpingtons	54	49	101	108	137	138	137	117	125	115	104	47	1,232
Mars Poultry Farm, Sunnybank	Do.	3	0	65	114	148	151	146	131	140	128	125	74	1,225
Kelvin Poultry Farm, Kelvin Grove	White Leghorns	30	73	87	102	147	154	152	124	145	116	72	23	1,225
Mars Poultry Farm, Sunnybank	Do.	20	55	92	111	132	142	149	129	139	135	81	36	1,221
J. Anderson, Mordialloc, Victoria	Do.	34	23	66	128	132	145	153	131	144	138	77	44	1,215
*W. L. Forrest, Márrickville, N.S.W.	Do.	38	38	107	120	128	145	138	109	115	106	101	68	1,213
W. Becker, Toowoomba	Do.	22	29	55	105	146	149	159	125	136	135	99	43	1,203
H. Hammill, Kogarah, N.S.W.	Do.	25	0	20	85	127	143	151	129	144	143	139	96	1,202
W. Hirst, Blacktown, N.S.W.	Do.	30	29	74	108	142	139	147	116	136	126	105	34	1,186
Mrs. C. Davis, Engelsburg	Do.	30	50	98	119	128	139	138	127	133	113	78	21	1,174
Moritz Bros., Kalangadoo, S.A.	Do.	5	0	8	91	136	146	159	142	150	131	124	71	1,163
J. G. Richter, Aratula	Do.	6	22	78	112	141	137	149	127	138	121	101	27	1,159
*Kelvin Poultry Farm, Brisbane	Do.	51	91	65	94	126	140	144	121	121	90	64	46	1,153
*J. H. Madrers, Kogarah, N.S.W.	Rhode Island Reds	44	50	53	117	132	139	128	106	114	100	117	53	1,153
*J. W. Macrae, Mareeba	Black Orpingtons	0	33	74	124	144	151	134	95	122	100	98	68	1,143
F. Clayton, Blacktown, N.S.W.	Rhode Island Reds	30	19	66	116	132	146	137	120	127	109	89	50	1,141
C. P. Buchanan, Brisbane	White Leghorns	42	67	89	113	119	140	133	98	117	105	70	45	1,138
Harveston Poultry Farm, Rockhampton	Do.	18	0	30	109	133	142	143	121	135	129	102	53	1,115
R. Burns, Sladevale, Warwick	Black Orpingtons	10	29	70	139	132	142	134	108	113	119	85	34	1,115
S. B. Tutin, Kalkie, Bundaberg	White Leghorns	66	74	88	107	134	144	121	89	94	92	67	14	1,090
J. Gosley, Childers	Do.	22	64	71	128	122	128	114	97	108	97	74	62	1,087
W. Lindus, Cessnock, N.S.W.	Do.	34	0	17	95	115	130	149	128	144	124	95	54	1,085
*J. Anderson, Mordialloc, Victoria	Red Sussex	86	71	53	93	119	112	121	88	101	80	96	57	1,077
F. W. Leney, Warwick	White Leghorns	23	2	32	84	136	141	147	130	124	118	89	37	1,063
A. T. Coomber, Bundaberg	Sicily Buttercups	20	47	31	43	112	134	135	112	120	107	124	74	1,059
L. K. Pettit, Eastwood, N.S.W.	White Leghorns	11	14	65	96	114	136	131	107	119	113	89	44	1,039
W. H. Forsyth, Willoughby, N.S.W.	Black Orpingtons	28	21	18	119	117	116	122	103	91	84	69	51	999
E. F. Dennis, Kelvin Grove, Brisbane	White Wyandottes	0	0	35	71	104	132	124	95	94	115	101	77	948
F. W. Leney, Warwick	Rhode Island Reds	19	20	0	53	131	138	135	110	113	110	67	19	915
	Totals	2,548	3,991	5,971	8,341	9,934	10,545	10,674	8,977	9,708	8,994	7,638	4,540	91,861

* Indicates that the pen is engaged in the single-hen test.

BALANCE-SHEET.

EXPENDITURE.	£	s.	d.	£	s.	d.
Prize money				36	9	0
Feed—						
Wheat, 327 bushels	79	14	6			
Maize, 18 bushels	3	19	8			
Pollard, 391 bushels	25	18	8			
Bran, 190 bushels	11	15	2			
Oilcake, 5 cwt.	3	6	9			
Desiccated meat, 4 cwt.	3	8	6			
Bonemeal, 4 cwt.	3	16	0			
Green lucerne, value	2	0	0			
Soup meat, value	3	0	0			
				136	19	3
Balance				296	13	7
Total				£470	1	10
RECEIPTS.						
Entry fees (9 withdrawals)				61	0	0
Sales of eggs—						
Orient S.S. Co., 490 dozen	26	3	10			
Barnes and Co. (net), 3,983 dozen	190	1	10			
Defence Department, 880¾ dozen	48	8	2			
Dining hall, 2,342⅓ dozen	144	8	0			
				409	1	10
Total				£470	1	10

BANANA BEETLE TRAP.

Mr. A. H. Benson, Director of Fruit Culture, paid a visit lately to Redland Bay to investigate the Banana Beetle Borer trouble, and to discuss with the fruitgrowers of the district some method of combating the pest. The extent of damage done to the banana groves may be estimated by the statement of one grower that during the previous three weeks he had trapped 4,380 beetles. Mr. Benson, on inspecting the traps, found 200 beetles in one of them. The trap consists merely of a banana bulb cut in half. The cut surface lies on the ground and the beetles are attracted to it from the plants in numbers, when they are easily destroyed. The traps or, rather, the cut surface of the half-bulb, if freshened now and then, will last for a considerable time. The beetles appear to prefer the cut bulb to the plant itself, as was shown by the fact that when the trap was placed beside young growing plants, the latter were not touched, although numerous beetles were around the trap. At the meeting of fruitgrowers, a motion was made to the effect that the trapping be made compulsory wherever the beetles exist, and it was carried by 35 votes to 6. Mr. Benson stated that the idea that the fruit was affected by the beetles' work was erroneous, because unless the beetle actually destroys the plant on which the bunch is growing, there is no sign of deterioration of the fruit.

Viticulture.

DRYING GRAPES.

A very instructive paper on Fruit Drying, by Mr. J. Allen, appeared in the January issue of the "Agricultural Gazette" of New South Wales. From it we extract the chapter on Drying Grapes, which will prove of much interest to vignerons in Queensland.

"Grapes of all classes," writes Mr. Allen, "are usually dried in the open air rather than in the evaporator. The former gives a more uniform and better sample, while the latter process is both slow and costly. In wet seasons, however, the evaporator may be requisitioned even for grapes, though, by using covered racks, this difficulty may be largely overcome. There are times, chiefly late in the season, when owing to damp nights and cold days, it is impossible to finish the drying properly in the open air, and it is then that even the grapegrower will find the evaporator almost an essential.

"Of recent years, drying racks have to a large extent superseded trays for drying currants, sultanas, and even lexias. They are more economical and turn out a superior article to that dried on trays in the sun. In the case of currants, however, the method that eclipses all others as far as the quality of the product is concerned, is to stack the trays containing the fruit on top of one another, and by this means to allow the fruit to dry slowly without direct exposure to the sun. The drawback to this method is that the cost is considerably increased by reason of the large number of trays required.

"Table Raisins.

"It will be found that the best raisin grapes are grown on the lighter and richer soils, and I have never yet in Australia seen a first-class raisin made from grapes grown on a stiff soil.

"To make a good table raisin, the grapes must be grown to perfection—that is, the grape when ripe should be large, thin-skinned, fleshy, and containing plenty of sugar, and the bunches must be well filled. The larger the berries and clusters, the better the appearance of the dried article will be.

"Picking grapes for either pudding or table raisins should be delayed until the fruit is perfectly ripe. For the latter purpose especially, an unripe grape is most unsuitable. When exposed to the sun they will turn red, will take longer to dry than ripe grapes, and the finished product will be sour and of inferior quality. My experience with regard to picking is that in nine cases out of ten the inexperienced grower imagines that as soon as the grapes are sweet enough for eating they are ready to pick for raisin making, and, contrary to all advice, he will start picking only to find at the end of the first week that the grapes are not turning a good colour.

"The grapes which have so far produced a good commercial raisin in Australia are Gordo Blanco, Muscat of Alexandria and Waltham Cross (sometimes known as Eleme). I have had samples of raisins sent to me made from other kinds of grapes, which presented a fair appearance, but if the grower placed these on the market to compete with the raisins made from the above-mentioned varieties, he would find that they would not sell, so long as the latter were obtainable.

"The process of curing the table raisin is as follows:—Pick the very best clusters—that is, only such as are well filled with large, fine grapes—cut out all damaged or hard grapes, and lay the bunches carefully on trays, which should be then placed in the sun. By the end of the first week one side should be fairly well dried, and the bunches should be turned. This may be done by placing an empty tray on top of the full one. Two men can then take hold of the sides and invert the two, thus exposing to the sun the side of the fruit which has been lying next to the tray. After this turning it usually requires about another week to finish the drying process, if the weather is favourable. If the weather is damp or cool, it will, of course, take longer, and it is better to stack up the trays at night, covering the stacks with empty trays. If a table raisin gets wet during the curing process, the stem gets dark and the bloom spoiled, and the grade is lowered and the value of the fruit depreciated.

"Table raisins require to be dried slowly, and it is doubtful whether the evaporator will ever prove satisfactory for curing them. Even when dried in the sun, a higher temperature than 96 degrees will cause them to burn and will spoil the sample. At the very most, they should not be exposed to a higher temperature than 110 degrees in the evaporator, and it is probable that green fruit would be damaged by even that degree of heat. Consequently the cultivation of raisin grapes cannot be recommended in districts where the evaporator would have to be resorted to for curing them.

"Pudding Raisins or Lexias.

"Grapes intended for this purpose should also be picked when fully ripe. All partially ripe and dried fruit should be removed, and the grapes then immersed for about three seconds in a lye made in the proportion of 1 lb. of Greenbank's caustic soda to 20 gallons of water. To turn out a raisin of good quality and appearance, the dipping solution should be kept at almost boiling point; if allowed to cool much below this, the fruit, instead of being a nice golden colour, will be brown.

"Other factors than the heat of the dipping solution may cause raisins to turn brown. For instance, it is impossible to make a good bright lexia, or a good quality of raisin of any sort, from grapes grown on some of the heavier or stiffer soils.

"It is a good plan to dip the fruit in the morning, or early afternoon, in order that it may have time to dry off before evening. Drying usually occupies from five to eight days, according to the weather. If dried on trays, it will be necessary on about the fourth day after dipping to turn the fruit, and care will have to be exercised to see that it does

not become too dry before it is taken in. A nice pliable fruit is always the best. Should there be any uncertainty as to whether the fruit is sufficiently dry or not, it can be tested by squeezing a few of the raisins between the thumb and finger; if no moisture exudes, then the fruit is quite dry enough. Lexias should be stemmed and graded as soon as possible after they are sufficiently dry to be removed from the tray to the sweat-box. If allowed to stand any length of time the stem becomes toughened and difficult to separate from the raisin.

"SULTANAS.

"For drying purposes sultanas should not be picked until fully ripe. A very common error, and one that greatly lowers the quality and the value of the dried product, is to pick the fruit too soon. Grapes that are apparently quite ripe and ready to pick for eating purposes should usually be left for at least another fortnight if they are to be dried. When they are of a clear amber colour, and perfectly sweet, without a trace of acidity in any of the berries, they should be about ready to pick. The last fortnight, before the fruit has attained this stage, adds considerably to the sugar content, and as this means increased weight and a better quality product, it is best not to pick until the fruit is dead ripe. As soon as possible after picking, the fruit should be dipped in a caustic solution.

"For sultanas, this should be made at a strength of 1 lb. of Greenbank's caustic soda to from 15 to 20 gallons of water—the exact quantity of water depending upon the toughness of the skin.

"The fruit should be dipped while the lye is almost at boiling point, but should not be immersed for longer than two seconds, or long enough to slightly crack the skin. The grapes should then be spread out thinly on drying racks, or on ordinary drying trays, and exposed to the sun. When trays are used, the fruit should always be turned the day after dipping. If the nights are cool, or rain threatens, the trays should be stacked up, and the stacks covered with empty trays, so that the fruit cannot be damaged. If the weather is very hot, the trays may be stacked up and allowed to remain thus until the sultanas are dry. Drying racks, where used, are usually provided with side curtains, which may be drawn to shelter the fruit from the direct rays of the sun.

"Under no circumstances should sultanas be exposed to too great a heat, as this will spoil the colour of the dried article and lower its value on the market.

"To realise the best prices, it is essential to produce a dried fruit of bright colour and high quality, and this may only be done by picking the fruit when dead ripe, dipping it carefully, and allowing it to dry slowly.

"ZANTE CURRANTS.

"The Zante currant is very easily cured. In this case also, the fruit should be allowed to hang until it is well coloured, and thoroughly ripe —that is until some of the currants on the bunches have begun to shrivel.

It may then be picked and placed on drying racks or trays as the case may be. Four or five days' exposure to the sun will usually dry the fruit so that it may be bagged, but should the temperature exceed 90 degrees in the shade, the trays should be stacked until the weather is cooler. In the case of drying racks, the curtains should be drawn to shade the fruit from the direct rays of the sun. As this fruit is liable to become moth-infested if exposed too long, it is advisable to bag it immediately it is sufficiently dry, and it is wise to leave it in these bags until it is stemmed and properly packed."

VITICULTURE AND THE WINE INDUSTRY AFTER THE WAR.

By G. A. GATTINO.

A reputable enologist, writing from the French trenches, expressed these two sentences:—

"(1) The victory of the allied Italians, French, English, and Russians is an absolute necessity to viticulture.

"(2) The victory of the aforesaid Allies cannot be doubted by anybody."

His letter brought to me a lot of reflections and considerations, and gave me the subject for writing this article, addressing same to all viticulturists of Australia in general, and Queensland in particular.

I do not think it is too early for speaking of what will happen after the war, but on the contrary, I believe that it is indispensable that the viticulturists and wine merchants study now the problems which will crop up, so as to prepare for the best and most advantageous solutions possible.

Producers and merchants must become organised for the purpose of surmounting the post-war difficulties.

As you know, the future of all industries depends on the contents of the future treaty of peace, and, therefore, only by organisation will the wine growers and merchants be able to warn the competent authorities, that the latter may not neglect their interests at the opportune moment.

Now, we will just see what is likely to happen at the end of the war. Certainly it cannot be admitted that things will revert in the *status quo ante*. The crises are too radical and the changes will be very marked.

As far as viticulture is concerned, I foresee, after the war, an important extension of grape plantations and a sensible increase in the consumption of wine.

An increase in the consumption of wine is a very certain thing, and using the phrase adopted by the abovementioned enologist, I could say that wine will come out from the war absolutely triumphant. Wine is to-day a real necessity to all fighters, who implicitly, and without any exact consideration, are recognising and proclaiming its high moral and energetic virtues.

Anybody who approaches soldiers coming back from the French, Italian, or Balkan war zones will hear them speaking of wine in enthusiastic and affectionate terms.

Wine raises the morale of the fighters, dissipates their sad thoughts, and comforts the soul. Wine is necessary to recoup their enormous loss of energy when the nervous system is under such tension that it can only be imagined by those in the firing line. That is the reason why there are no teetotal soldiers in the trenches. [There is a very large number of abstainers in the trenches.—Ed., "Q.A.J."] That is the reason why that enologist says also that the war will be for wine a most gigantic advertisement.

You must admit, therefore, that all these brave soldiers returning home cannot forget their wine, and in accordance with their means, they will often substitute wine for their tea.

The Italians, French, and Spaniards drink wine plentifully, and it is indisputable that drunkenness in those nations has the lowest percentage in Europe.

Besides the increased consumption of wine in the aforesaid countries, other facts will confirm the opinion that the increase in the consumption will be general.

The great English armies which are fighting in France, the Belgian army, and the Russian troops gone to France and Macedonia, have all learned to drink wine daily, as a rule, and it is also proved that many of the traditional drinkers of tea, cider, or whisky, deplore having to go back to their national drink when wine is not available.

The conversion of the Anglo-Saxons to the cult of Bacchus will not be one of the smallest results of the great European war.

Several Governments have taken advantage of war conditions to pass prohibitive provisions against spirits. This action was really necessary, but, owing to political weakness, it could not be submitted until now. That which all the wine associations of the old country have declared and repeated: "Wine chases out alcohol," has at last been demonstrated.

From a circular dated 28th March ulto., from Caldwell's Wines Company, Limited, Sydney, one can already see the beginning of that consequence. The said Australian wine growers write as follows:—"Owing to the enormous increase in the prices of whiskies and brandies, Australian wines are in greater demand than ever before."

For the same reason wine is meeting with such favourable preference by the soldiers.

The sale to them of any alcohol or other beverage of high alcoholic title is strictly prohibited.

What will also bring about an increase in wine consumption is the higher wages to the workers, who will thus be able to afford to introduce wine in their families. I conclude by saying that the future of viticulture looks full of the best hopes, but it will depend on the terms and stipulations fixed by the peace and commercial treaties, and by the

conventions constituting the base of the future relations between the nations. The questions relating to the admission of wine in this country, in the British Empire, in the Allies', neutral, and enemy's countries, will be carefully regulated.

Agriculture in general is one of the most important branches of our national economy, and therefore, if the wine growers and merchants would organise, they could formulate and present in time to the Government the indispensable measures for the encouragement and amendments of the tariff as are wanted for the protection of our national trade and the development of the Australian production in the wine industry. By organising the wine industry we would obtain from the Government such internal laws and Acts as a means of encouraging the increase in the plantations of grapes, and the increase in the consumption of wine.

The Government could attain this end by encouraging the formation of co-operative wine cellars as per my articles which appeared in the September, October, and November, 1916, issues of the *Queensland Agricultural Journal*, by instituting experimental grape farms with annexed cellar, distillery and enological college; subsidising new plantations and facilitating the supply of vine cuttings; issuing money and medal prizes for the best up-to-date farm or cellar; for the best production of grapes or wine; for the best and lightest table wine produced. This would induce the growers to experiment in new methods of plantation, cultivation, and pruning, and would cause the winemaker to apply the most appropriate system and process of manipulation, fermenting, &c.,* increasing the duty on imported wines and spirits; regulating the use of the alcoholisation (fortifying) of the wines; maintaining a high price for alcohol by making its sale a State monopoly, which has been in vigorous existence in Italy for a number of years, and with great profit to the State and appreciable advantage to public health; facilitating the granting of wine licenses to the growers, the export of wines, &c.

* Will the wine growers of Roma or other localities awaken and give a start with the formation of co-operative wine cellars as per the articles on the subject which appeared in the issues of this Journal for September, October, and November, 1916. If only a few growers would decide on the formation of such an Association, I would draw up for them the "Articles of Association of the Co-operative," and give them my advisory assistance for the technical and business management of the new company. The Government would also encourage its formation by paying a subsidy loan of £1 for each £1 of capital possessed by the company. I am certain also, that besides encouraging the increase in the numbers of grape plantations, the formation of these co-operative wine cellars will necessarily induce the Government to also institute experimental grape farms, and formulate such measures, acts, and amendments of the tariff as they are wanted for the development and protection of a great industry. The Co-operative Wine Cellars would give birth to a form of commercial organisation which appears to be really necessary for the small and medium producer. Even if not immediately producing great quantities of wine, the Co-operative Cellars will attain the constitution of determined, constant types of wines in the localities where the cellars are operating, and by establishing a reputation for good, natural, and well-made wines, we would realise a consequent increase in the daily consumption of same, to the benefit of the public health and wealth.

In such a great State as Queensland, where immense areas of hilly, stony land of dry, calcareous loam soil are not utilised and unadapted for the extensive cultivation of other crops, this great agricultural wine industry would bring in its train new life, new prosperity, and a new source of wealth. With the protection of the Government, the returned soldiers also would find greater attraction and more glorious promise in the future of a vineyard than in anything else.

Once wine becomes a popular beverage you would see that anyone in this country having some available ground at his residence would grow his own grapes, for the use of his family at least, and none will be too poor to enjoy the purest and most wholesome of all stimulants—good, cheap, native wine.

As I previously stated, drunkenness also would be minimised, and the abstinence societies would have no more reason for existence. It is therefore indispensable that harmony should reign amongst all sons of this country, and wine growers and the wine merchants, who have more common interest than is actually believed.

The war taught us all that individual interest is a very small thing compared with general interest. We must not forget that the prosperity of the individual is strongly bound to that of collectivity. With the protection of the State and Federal authorities, beneath the glorious flag, with a strong commercial organisation, with the intelligent initiative of the individual, it can be foreseen with certainty that viticulture will have, after the war, a future full of prosperity.

The man on the land should give a good start, and I will give all my modest assistance for the success of this great wine industry. Let us take this glorious task in hand; let us work with all our heart and energy, for truly the object is worthy of our best endeavours.

The "Journal of Agriculture of Victoria" for 10th January, 1916, contains a very valuable and instructive paper by the Government Viticulturist of that State, Mr. F. de Castella, which we republish in the interest of Queensland vignerons. The paper is entitled—

THE SUMMER BUD OR "YEMA" GRAFT OF THE VINE.

Mr. Castella writes as follows on the subject:—

To plant a vineyard liable to destruction by phylloxera would be, to say the least, illogical, even in districts into which the insect has not yet found its way. It is already firmly established in several widely separated portions of the State, and the time will inevitably come when the whole of Victoria will be infested. In already phylloxerated areas, the resistant stock is, of course, indispensable, and the plantation of vines with vulnerable roots is quite out of the question.

A vineyard on resistant stocks may be established in two ways:—

1. Plantation of already grafted vines raised in a nursery, or, as they are usually called, "bench grafts."

2. Field grafting—in other words, the plantation of the vineyard with ungrafted resistant vines or stocks, which will subsequently be grafted to the European or "Vinifera" variety, from which it is desired to obtain fruit.

Field grafting, though the older method, has been gradually and very generally superseded in France by the planting of nursery-raised bench grafts, which renders possible the immediate establishment of an absolutely homogeneous vineyard, since it permits the weeding out, when lifting from the nursery, of all faulty grafts; only those being planted in which the union between stock and scion is flawless, thus insuring absolute evenness of the plantation, or what is called in California, "a good stand."

The chief objection to field grafting, especially in the colder climate of Northern Europe, is that a completely even stand can rarely be relied upon. Unless the spring be exceptionally favourable for the operation of grafting, gaps occur where vines have failed, as well as a certain proportion of faulty grafts which scarcely ever develop into thrifty vines. In our warmer Australian climate, weather conditions in spring are more favourable for grafting, and except in such an unusual season as the present one, results are generally far more satisfactory. Our climate is more similar to that of Spain and Portugal, where field grafting is held in higher esteem than in France. Nevertheless, even with us, anything which can insure a higher percentage of perfect unions will be a distinct boon to those reconstituting by means of field grafting, and the graft about to be described undoubtedly contributes to this result, both by the perfection of the union, and by the second chance it provides, of re-grafting the following spring, any of the summer grafts which have failed, or which are unsatisfactory.

THE YEMA GRAFT IN SPAIN.

"Yema" means, in Spanish, a bud or eye—the germ of anything in fact, since it also signifies the yolk of an egg. It is the name generally given to this graft in southern Spain. Though often referred to as "budding" in northern Victoria, the operation is distinct from budding in the usual sense of the term, and as currently practised on citrus, roses, &c. It is real graft—a summer bud graft—for the wood of the vine is rather deeply cut into, and the woody core of the scion-bud is not removed as is usual in ordinary budding. The main differences to be found between it and ordinary grafting are the season when it is carried out, and the very small dimensions to which the scion is reduced. Like ordinary grafting, it is performed on the portion of the stock beneath the surface of the soil.* Budding is practised above ground, and usually on green herbaceous canes.

It was at Jerez de la Frontera, in Southern Spain, the home of sherry, that the writer first made the acquaintance of this graft which, since its introduction into Victoria, has been so successful that it bids

* Though the graft is made two or three inches above the surface level it is invariably covered by a protecting mound of earth, so that, during the knitting period, it is several inches below the surface of the mound. (See Fig. 3.)

fair to become the favourite field grafting method. On his return to Victoria, the Spanish graft was described in the "Journal of Agriculture of Victoria," in the issue of June, 1908. This description is here reproduced. It will be followed by some further details in the light of practical experience gained since its introduction into Victoria.

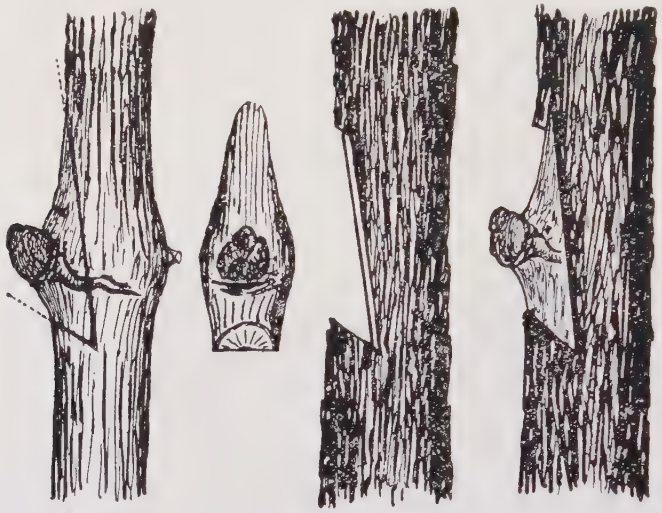

FIG. 1.

A and B.—Removal of bud for *Yema* graft.
C.—Stock ready to receive bud of *Yema* graft.
D.—*Yema* graft completed and ready for binding with raffia.

The other method is known as *Yema*. It is a summer bud graft and was quite new to me both as regards method and season for execution. It is a true graft, and not a form of budding in the sense in which we usually understand it, for the bud is removed together with a fair sized fragment of the already woody shoot of the current year's growth. The stock is prepared to receive it by the removal of a similar shaped piece of wood by means of four cuts of the grafting knife; into the gap thus made, which reaches nearly to the centre of the cane,* the properly cut eye is carefully fitted and securely bound with raffia. Care must be taken in fitting the bud into its place that the cambium layers of stock and scion correspond as accurately as possible. When tying, the raffia must first be placed over the bud and bound round and below it so as to insure thorough contact at the base of the graft.

This graft is best suited for cases where there is but slight difference in diameter between stock and scion, as in the case when a one or two year old rooted vine is grafted in the vineyard. *The upper part of the stock is not cut off but continues its growth,* the flow of sap which is thus maintained enables the union to take place under most favourable conditions. The graft knits, but *the bud remains dormant* until the following spring, when, after the upper part of the stock has been cut back, it makes very vigorous growth.

* According to later experience this would be too deep, as will be seen later.

August is the best month for the execution of this graft in Spain. This corresponds to February in Victoria; a convenient time, falling, as it does, between harvest and vintage. As soon as the young shoots of the current year are sufficiently lignified to provide a properly ripened but the operation may be performed. The bud is grafted on at about the level of the ground which is then heaped up around it into a high mound to protect it from changes of temperature and desiccation. (See Fig. 3.)

This graft practically gives the vigneron "two strings to his bow." When the time for ordinary spring grafting comes round it is possible to see if the bud has taken or if it is dead; in the latter case the stock is cut off half an inch below the bud graft which has failed and re-grafted in the ordinary way.

The unions obtained by means of this graft in southern Spain are really magnificient. . . . At the well-known Tula vineyard of

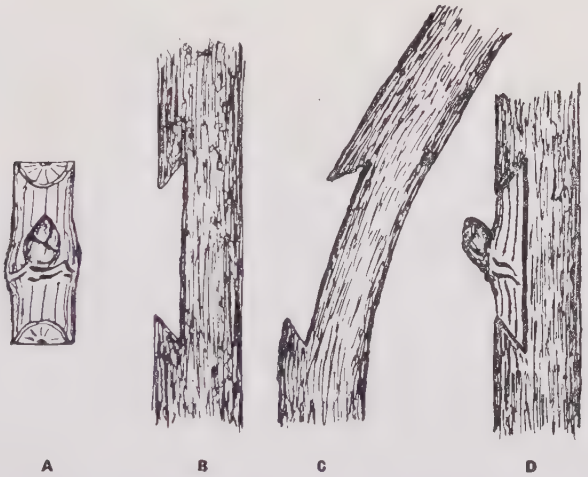

Fig. 2.—The Spanish *Yema* graft—second style.
A, the scion bud; B, incision in stock; C, same, bent to facilitate insertion of scion; D, graft completed and ready for tying.

Messrs. Gonzalez, Byass, and Coy., this style of grafting is in great favour. "*Espiga ne vale nada*" (The *espiga** graft is no good) said the *Capataz* (overseer) of Tula to me. He assured me that with the *Yema* a larger percentage succeeded and that the unions were more perfect. I have collected full information concerning this interesting graft and feel sure that it is at least worth a careful trial in the warmer parts of Victoria where climatic conditions are so similar to those of Andalusia, and where the perfect union it gives will no doubt render it popular.

In Spain, the graft is performed in two distinct ways. In addition to that illustrated in Fig. 1, it is sometimes executed as shown in Fig. 2. As will be seen, the fragment of cane which constitutes the scion is of practically the same thickness throughout. The socket or incision into

* Espiga is the Spanish name for the ordinary cleft graft.

which it will be fitted on the stock is also of different shape, being cut at the same angle above and below. It might be called a dovetail graft. When fitting the scion, the stock can conveniently be bent, as shown at C, Fig. 2, thus slightly elongating the socket, and facilitating the insertion of the scion, which is firmly held in place on the stock being allowed to straighten out again. A very neat graft can thus be executed, provided the scion has been judiciously chosen as to size, and it, as well as the stock, accurately and cleanly cut. It is, perhaps, a little more difficult than the first method, for which reason it was not described in the report quoted from above.

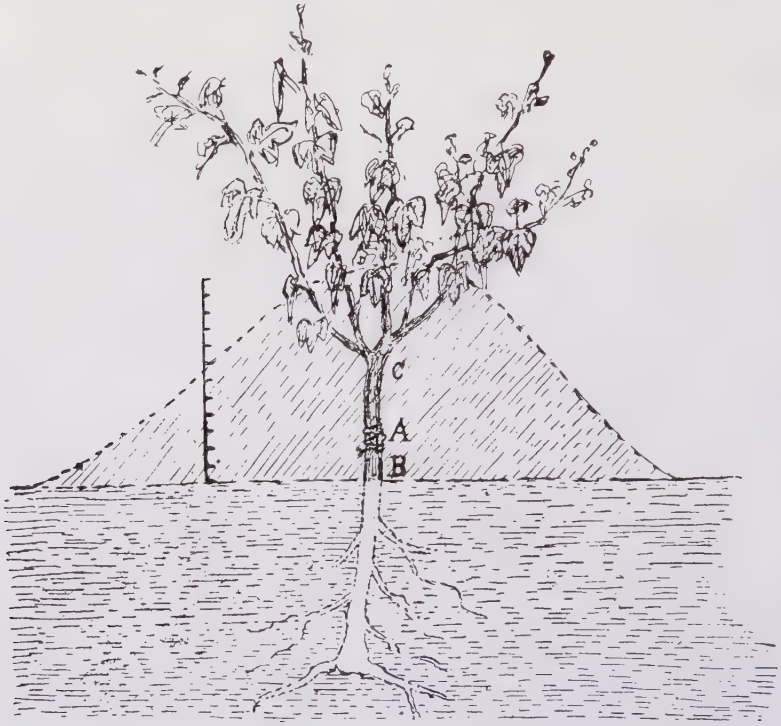

Fig. 3.—Young resistant vine in February, six months after plantation as an "engrafted rootling." The *Yema* graft has just been inserted at A, and protected by a mound of loose soil about 12 in. high—scale of inches to the left.

A general idea of the graft may be formed from Fig. 3, which shows a young resistant vine, planted as an ungrafted rootling in, say, August, 1915; the scion bud having been grafted in at "A" in February, 1916. As will be seen, immediately after grafting, the whole stem of the vine is mounded up with loose soil; the height of the mound is usually about 1 foot, the base of the young canes, and a good many leaves, being often covered with soil. It will be noted that the top of the stock is not cut off at the time of grafting,* but is allowed to continue its growth. This is, no doubt, one of the factors contributing to

* According to M. Maïs, severe topping is recommended immediately after grafting (see page 46). That is not usually done in Victoria. If the vine has not made very strong growth, it is probably better not to top, though in the case of very vigorous vines it might be an improvement; it would, at any rate, reduce the power of the wind, which, on a very strong vine, tends to break down the mound.

the excellence of the unions; the sap circulating freely in the tissues immediately adjacent to the graft, callusing is very thorough and complete.

Towards the end of winter the mound should be removed; it is, in fact, usually broken down before this by the ordinary cultural operations. It is then possible to see if the graft has succeeded, in which case the bud will be found to be large and healthy, and firmly united to the stock by the callus which has formed. If the graft has failed, the scion bud, now considerably shrivelled, can easily be rubbed out with the finger. If the graft has satisfactorily taken, the stock is now cut off with the secateur at "C," Fig. 3. On no account should it be cut any closer to the bud, as the stock would be liable to die back on the opposite side to the bud. A stub or butt of the old stock 5 or 6 inches long should be left above the graft, which will be finally removed a year later. Should the graft have failed, the vine is allowed to remain until September or October (in Victoria), when it can be cut back at "B," Fig. 3, and cleft grafted in the usual way. The *Yema* graft should be placed about 3 inches above the level of the soil, so that, in case of its failure, the cleft graft will not be so deep as to entail trouble with scion roots.

SIMILAR GRAFTS IN FRANCE.

Curiously enough, this graft does not seem to have found its way to France; at least not during the period of active reconstitution (1885-99), during which French ingenuity devised an extraordinary number of new methods for budding and grafting the vine. It is not described in "Grafting and Budding,"* though the grafts of Besson, Massabie, and of Clarac (No. 2) present some points in common with it. These, however, are buds rather than grafts. The form of grafting which most resembles it, especially as regards the season for its execution, is the well-known Cadillac graft—a side cleft summer graft which will be described later.

A graft was, however, described in the *Progres Agricole*, of 25th February, 1912, by M. J. B. Maïs, which is practically identical with the Spanish Yema, second style,† as will be seen by reference to Fig. 4.

The following extracts from Mr. Maïs' article will, no doubt, prove of interest:—

Stocks (ungrafted) should be planted from December to March (June to September in Australia). As soon as the shoots are about an inch long a bud is placed, as shown in Fig. 4 (scion A, stock B), and tied with raffia.

One-third of the thickness of the stock is removed, and in its place is fitted one-third of the scion cane bearing a bud. This bud rots and makes way for two or three smaller buds which develop around it, sending out canes of three and four yards long the following season.

After the 10th August (February in Australia) the work may be continued, the buds being taken from the current season's canes. After

* New Methods of Grafting and Budding, as applied to Reconstitution with American Vines, by Dubois and Wilkinson—published by the Department of Agriculture of Victoria in 1901.

† J. B. Maïs, President, Syndicat Agricole of Lectoure (Gers), France, in "Progres Agricole," Montpellier, 25th February, 1912.

the 10th September (March in Australia) cold rains are likely to render results uncertain. During the currency of the whole summer it is difficult, a month after grafting, to tell that there has been a graft at all so perfect is the union. Needless to say, scions for grafting until July should be preserved in nearly dry sand and in the dark if possible. Should the first graft fail, another can be placed in position in August (February in Australia) about an inch below it. Should this fail also, the ordinary cleft graft can still be practised the following spring, thus assuring thorough success throughout the whole vineyard.

The vigour of plantations thus established is much superior to those planted with grafted rootlings up to the fifth year; afterwards, the difference is less noticeable. This enhanced vigour is explained, first, by the suppression, so to speak, of the graft (the union being so perfect),

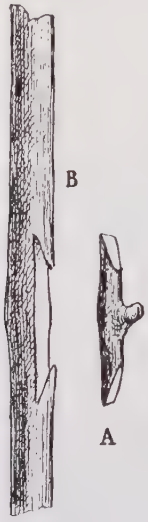

FIG. 4.

and second, by the fact that when wild vines (ungrafted resistant rootlings) are planted they have often ten or fifteen roots, whereas with grafted rootlings there are sometimes only one or two; furthermore, by leaving the wild vine to itself during the whole of the first season, it grows much more than its grafted neighbour, and as a result its roots penetrate more deeply and develop more vigorously, thus stimulating the growth of the scion much more during the second year.

If grafted in August-September (February-March here) all the canes of the stock should be severely topped in order to give a check to the sap, such as will bring about a rapid union (*soudure*).

One man can easily do 350 to 400 grafts a day. The scions should be cut beforehand and kept fresh in a piece of wet bag; in order to make rapid progress, it is necessary to have a choice of scions, owing to the difference in diameter of the stocks.

In spring it is well to drive in a small stake to each vine; owing to their vigour, the wind might break them out, thus causing blanks.

Fig. 4 is reproduced from Mr. Maïs' article.

Tropical Industries.

TOTAL PRODUCTION OF THE WORLD'S RUBBER.

A correspondent of the "Times Trade Supplement" writes:—

"The world's production of rubber for the year 1916, which will be on a greatly increased scale owing to the fact that much of the acreage planted at the time of the rubber boom five or six years ago will now be coming into the market, will probably not be far short of 170,000 tons. It is estimated on good authority that the total supply for 1915 was 107,000 tons from plantations, 37,000 tons from Brazil, and 13,600 tons from all other sources, and while the war lasts it appears likely that even this enormous output can be absorbed, notwithstanding the entire closure of the Middle European markets, which before the war took about 14,000 tons of rubber annually. During the present year it is probable that some 25,000 tons in excess of 1915 will be marketed, and we may assume that low prices will continue. The average price of rubber throughout 1914 was 2s. 3½d. per lb., while last year, in consequence of the considerable increase in value during the latter part of the time, the price worked out at 2s. 6d. per lb. Unless new calls for rubber, greatly exceeding present requirements, should arise, the existing value of 2s. 3d. to 2s. 6d. per lb. seems likely to hold good, and the 1916 average will probably be much the same as that of 1915.

"As to future prices, it must be remembered that for some time to come we are faced with an annual increment from planted rubber of not less than 30,000 tons, owing to the enormous new areas under cultivation coming forward each year. The acreage of rubber in the plantation of the Middle East probably now exceeds 800,000 acres, and taking the low estimate of 300 lb. per acre and the price of 2s. per lb., we may assume that when the whole of these trees are mature the annual value of the rubber crop may reach £24,000,000. If the cost of production is assumed to be 1s. per lb., which even now has been found practicable on many large estates, we obtain from rubber at 2s. per lb. a very handsome profit on the capital outlay, since £15 per acre profit would pay 10 per cent. on an outlay of £150 per acre. Although it is both difficult and hazardous to predict the future course of prices, we are of opinion that rubber will not be likely to fall below 2s. per lb. for many years to come."

On the yield of rubber per acre, the "Times" states:—

"Though it would not be prudent to base our estimates on what must be regarded as the phenomenal yields of certain estates, we think that it will be found in the long run that from 400 lb. to 450 lb. per acre will be a fair crop for mature plantations in the best parts of the Malay Peninsula. We are aware that the Seafield Estate last year gave an average of 682 lb. per acre from an area of 124 acres, planted in 1904, that is to

say, from trees of ten or eleven years of age, and that from the entire area of 1,940 acres the average yield per acre was 439 lb. A very experienced planter, who bases his estimates on the tapping of the oldest trees, has stated with confidence regarding another property, that eventually all the trees may be expected to yield at the rate of 600 lb. per acre, but at present our knowledge of the effect on the life of the tree of tapping to this extent is very limited, and it may be that there is a point beyond which it will be found unwise to carry the process of extraction of latex. It will be seen that at 100 trees per acre a crop of 400 lb. is equivalent to a yield of 4 lb. per tree, which is in excess of the average of mature trees, even if widely planted. Mr. H. Wright tells us that a fair average from young and old trees would be 2 lb. per tree, but the yield depends upon many different factors, and is greatly influenced by the system of tapping adopted."

COIR AND ITS PREPARATION.

(From the "Fiji Planters' Journal," April, 1917.)

Coir, the fibre from the husk of the coconut, is best (finest, most lustrous, and most resilient) when taken from the immature nuts, eight to ten months old. The practice, however, of using green husks for fibre would reduce the output of copra, a much more valuable product. Unless extra prime articles are wanted, the husks from ripe nuts are very satisfactory. At present these husks are practically valueless except in places where they are used as fuel. This state of affairs is causing the waste of a commodity which has the world for its market, and a broad field of uses opens to its application. The partly-cleaned fibre is excellent for caulking boats to prevent the water from entering. The clean fibre is used, without further preparation, for upholstering and for stuffing cushions and mattresses. Mr. Wright, of the Wright Furniture Company, Manila, says that well-cleaned fibre at 6 centavos per kilo could be used by his company in great quantities. When twisted into ropes and cables, coir is used by ships where the waves jerk and pull incessantly and where resiliency as well as strength is needed. Coir is without a peer where sudden heavy strains are placed upon it. Doormats and hall matting of coconut fibre are in demand throughout Christendom.

For ropes and mats the fibre should be well cleaned. This may be done in any one of several ways, three of which are worthy of mention here. In most Oriental countries where coir articles are made, the husks undergo a long period of retting. They are buried in pits along the seashore where the constant change of tidal water keeps them wet without permitting decay. The husks are left in these pits for from eight to ten months, causing the corky pulp to soften and disintegrate to such an extent that the fibres may be separated from it and thoroughly cleaned with very little subsequent labour. The retting process is sometimes carried on in vats of fresh water; but this system is very unsatisfactory, since the husk decays and the fibre becomes weak and of diminished value.

Machines have been tried for cleaning coir, but they have thus far been only a partial success. The husk is soaked to soften the pulp somewhat and is then fed by hand, a small section at a time, to a series of comb-like wheels. As these wheels can shred only one end of a section at a time, the piece must be fed in, withdrawn, reversed, and fed in again, to each of the wheels. These clutch wheels, as they are called, are graded from coarse to fine, as are the cards which follow them for the purpose of further loosening the pulp and combing the fibre. The partly-cleaned fibre is then thrown into a drum, where it is beaten and shaken to remove the dust and impurities, after which it is carded again and is ready for use. Theoretically this is all right; but in practice fibres are broken and poorly cleaned; and the hand feed makes the process slow.*

In the third method the husks, after the outer glossy part is crushed to admit of the free permeation of water, are soaked for a period of twenty-four hours. (It may be found necessary to place a weight on the husks to keep them covered by the water.) They are then taken out, the glossy part peeled off, and the husk beaten on the concave side with a mallet until the fibres are finely separated and the pulp is thoroughly loosened. Rubbing and shaking before all the pulp is beaten loose only lengthens the process. Beating the convex side of the husk before the fibres are all separated causes the husk to split up into segments instead of being divided into its component fibres by the elimination of the pulp. After the fibres have been separated, the dust is shaken out and the material is ready for washing and picking apart still further to get rid of the last of the extraneous matter. Drying completes the process.—Charles F. Fraker, in the "Philippine Craftsman."

HOW TO MAKE A PERMANENT WHITEWASH.

A first-class whitewash which will not rub off is made by dissolving 2 lb. of ordinary glue in 7 pints of water, and when all is dissolved, adding 6 oz. of bichromate of potassium, dissolved in a pint of hot water. Stir the mixture up well, and then add sufficient whiting to make it up to the consistency of thick cream. Apply with a brush in the ordinary manner, as quickly as possible. This dries in a very short time, and, by the action of light, becomes converted into a perfectly insoluble waterproof substance, which does not wash off, even with hot water, and at the same time, does not give rise to mould growth, as whitewash made with size often does. It may be coloured to any desired shade by the use of a trace of any aniline dye.

Or 1 peck of lime slaked in boiling water, and kept just covered by the water while slaking. Strain through coarse cloth. Add 2 quarts of fine salt dissolved in warm water, 1 lb. of ricemeal boiled in water to a thin paste, ¼ lb. of whiting, and ½ lb. of glue dissolved in warm water. Mix all thoroughly, and let stand covered for two or three days; stir occasionally. Heat the mixture before using.

* *See* "Queensland Agricultural Journal," Sept., 1912, "The Coir Industry," Vol. xxix. p. 4.

Botany.

ILLUSTRATED NOTES ON THE WEEDS OF QUEENSLAND.

By C. T. WHITE, Acting Government Botanist.

No. 7.

"GRASS SEED" OR "MACKIE'S PEST" (*Chrysopogon aciculatus*, Trin.).

Description.—A shortly creeping grass, with erect stems about 1 ft. high. Leaves short. Inflorescence (seed-head) a narrow compact panicle, 3-4 in. long, with numerous slender branches. Spikelets narrow, 2½-3 lines long. Awn (bristle) short and fine.

A native of tropical Asia, Australia, and South Pacific Islands.

There are comparatively few grasses that can definitely be said to be noxious, but with the species under notice there can be but little doubt but what it must be placed under that category.

The grass is continuously being sent in for determination from the more tropical parts of the State, and has recently made its appearance in Southern Queensland.

Mr. E. Jarvis (Government Entomologist, Gordonvale) writes:—"We have a few exceedingly noxious weeds here, the worst of which is the so-called 'grass-seed,' perhaps not a weed in the strict sense of the word, but nevertheless a veritable scourge which takes most of the pleasure off collecting in the bush."

Mr. W. F. Bevington writes: "This grass is known as 'Mackie's Pest' here (Mulgrave River), and it is indeed a pest. It usually takes an hour to get the grass-seeds out of one's clothes."

C. S. Crosby, writing on the vegetation of Vavau, one of the Tonga Islands ("Journ. Linn. Soc. Bot. 35," p. 22) states: "The awns cleave to one's socks and are apt to produce irritating sores which may confine the sufferer to his couch for months."

Uses.—Its sharp pointed awned seeds militate against its use as a fodder. Mr. B. Jardine, of Somerset, in forwarding specimens for identification, stated that it had been brought over from Papua, and proved a suitable cover for cocoanut plantations in the Philippine Islands. According to Safford ("Useful Plants of the Island of Guam") the straw is used for making hats and mats.

Eradication.—In small areas hand-forking and burning. In paddocks ploughing out and planting with some strong-growing superior grass likely to smother it, as *Paspalum dilatatum*. The grass is scarcely a weed of cultivation, its greatest holds being in old deserted plantations and along road sides. In such localities spraying might prove successful.

PLATE 14.—"GRASS SEED" OR "MACKIE'S PEST" (*Chrysopogon aciculatus*).

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RETURNS OF COWS FROM 27TH MARCH TO 26TH APRIL, 1917.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Lady Dorset	Ayrshire	14 Sept., 1916	697	4·8	39·45	
Sylvia II. ...	Shorthorn... ...	16 Jan., 1917	690	4·8	39·06	
Hedges Madge	Holstein	22 Mar. ,,	779	4·2	38·45	
Lady Melba	,, ...	14 Feb. ,,	902	3·4	35·84	
Iron Plate ...	Jersey	9 Dec., 1916	478	6·3	35·68	
Miss Edition	,, ...	25 Dec. ,,	705	4·3	35·67	
Violette's Peer's Girl	,, ...	13 Dec. ,,	484	6·2	35·55	
Glade ...	Shorthorn... ...	29 Mar., 1917	599	4·4	31·02	
Cocoatina ...	Jersey	6 Mar. ,,	647	3·9	29·60	
Comedienne	,, ...	24 Nov., 1916	442	5·6	29·27	
Thornton Fairetta	,, ...	26 May ,,	302	8·0	28·72	
Miss Betty	,, ...	27 Mar., 1917	637	4·1	28·68	
Lady Spec...	Ayrshire	17 Jan. ,,	640	3·8	28·51	
Lady Annette	,, ...	11 Nov., 1916	501	4·8	28·36	
Miss Bell ...	Jersey	1 Aug. ,,	396	6·0	28·13	
Constancy ...	Ayrshire	27 Dec. ,,	553	4·3	27·98	
Twylish's Maid	Jersey	2 Nov. ,,	390	6·0	27·71	
Belinda ...	Ayrshire	23 Feb., 1917	557	4·0	26·15	
Sweet Meadows	Jersey	18 Aug., 1916	242	8·2	23·59	
Glen ...	Shorthorn... ...	18 Jan., 1917	461	4·4	23·87	
Jeannie ...	Ayrshire	27 Oct., 1916	467	4·2	23·04	
Charity ...	Jersey	8 Jan., 1917	256	7·5	22·80	
Nina ...	Shorthorn... ...	23 June, 1916	436	4·4	22·58	
Glow 6th ...	Guernsey	?	358	5·1	21·55	
Mistress Bee	Jersey	11 Jan., 1917	336	5·3	21·04	
Hedges Dutchmaid	Holstein	22 Aug., 1916	405	4·4	20·97	
La Hurette Hope	Jersey	6 Oct. ,,	289	6·1	20·86	

The cows were grazed on natural pastures only.

PRACTICAL BACON-CURING.

The season is approaching when the farmer's pig for home consumption will be ready for slaughter. We have given several recipes for curing bacon and hams; still, we may always gain a good hint from our friends over the sea. Durban, South Africa, through the medium of the "Agricultural News," supplies the following recipe:—

"People often desire details of a simple method of curing bacon. The following practical hints will be found most useful for carrying out on the farm:—

"After killing, let the pig hang overnight and cure the next day. If the intention is to roll the bacon, saw or cut the carcass into two equal sides and remove the ribs, shoulder-blade, and ham bones; if the bacon is not to be rolled, and the pig should weigh over 100 lb., remove the ribs (which can be used fresh or salted), cut off the ham, which should be round, and cut off shoulders straight across. If the pig is a large one, say, 150 lb., remove the shoulder-blade, as it is somewhat difficult to cure.

"*Salting.*—For a pig of 120 lb. use about 8 lb. or 10 lb. of salt, 2½ oz. of saltpetre, 1½ lb. sugar, 2 oz. ground allspice; mix these well and thoroughly, and rub into the meat, for which purpose a trough made of 2 in. deal may be used—18 in. wide at the bottom, 2 ft. wide at top, 3 ft. 2 in. long, and 1 ft. 10 in. deep, inside measurement. This has proved excellent for long sides.

"Sprinkle a fair quantity of the salt mixture in the bottom of the trough, and place the sides in, skin downwards; seven days after placing in trough remove the sides, sprinkle a little of the salt mixture over them, and replace in the trough, but be careful to reverse the position by placing the side that was first on top now at the bottom of the trough, and the bottom one at the top. Repeat this process on the fourteenth day, and at the end of the third week remove from the trough.

"*Salting and Rolling.*—In a pan of water wash away all surplus salt from the sides, and hang up to dry for a day. Many are strong believers in the dry-salting, but allow the brine that accumulates in the trough to remain there until the bacon is cured. A day or two after the bacon is taken from the trough is the best time for rolling, and rolling of bacon must be regarded as anything but a success unless it is done thoroughly tight and solid.

"Only the best cord should be used. The smoking of bacon is most important. There is no necessity for the average farmer to build an elaborate smoke-house. A large drapery case, about 3 ft. 6 in. square, will answer the purpose very well, using the boards from the cover and bottom to make the sides, say, 5 ft. high. This can be easily done by using 2 in. by 3 in. deal battens, 5 ft. long, one for each corner, and nail securely. Never place the fire for smoking underneath the bacon, but dig a trench about 6 in. deep and 9 in. wide, running from under the smoke-house to about 6 ft. back.

"Farmers who have tried this formula have found it comparatively simple."

General Notes.

DENATURED ALCOHOL.

What does denatured alcohol mean? To the majority of persons alcohol means liquor—something to drink—but few know that beyond its use as a stimulant, and to some extent, in the arts and as a fuel, it is also a source of power as a substitute for gasolene, petroleum, and kindred hydrocarbons. When the Denaturing Act was passed by the American Congress, about the year 1907, alcohol leaped into fame, not as an intoxicant, or as the humble servant of the lamp, but as a new farm product for use in farm engines, motors, heating, lighting, &c.

In 1916 H. Hamel Smith, editor of "Tropical Life," wrote that the Russian Minister of Finance was organising an international competition, with prizes ranging up to £3,000, for methods of rendering methylated spirits and similar harmful liquids absolutely undrinkable, and a second competition was being arranged, with prizes up to £7,500, for new or improved methods of utilising alcohol for combustible or other purposes. The total awards would amount to nearly £68,000.

"Tropical planters," said Mr. Smith, "and others in all parts of the world, should take an interest in this contest, and try to induce their respective Governments to do the same, as the enormous amount of raw material that is made available every year from the waste products of manila fibre, banana, coconut, sugar, cacao, and other industries would allow an output of alcohol suitable for fuel and other purposes sufficient to enable the British Empire and her Allies to be independent of unfriendly nations for their supply of spirit for such purposes."

Denatured alcohol is simply alcohol which has been so treated as to spoil it for use as a beverage or medicine, and prevent its use in any manner except for industrial purposes. Denaturing can be accomplished in many ways. In England a mixture suitable for industrial purposes, but unfit for any other use, is made by mixing 90 per cent. of ethyl alcohol (alcohol made from grain, potatoes, beets, &c.) with 10 per cent. of methyl, or "wood alcohol." In Germany some of the other denaturants are camphor, chloroform, iodoform, ethyl bromide, benzine, castor oil, &c.

Mr. F. B. Wright, U.S.A., in a very interesting work on the subject, gives full details as to the various methods of producing the desired results, and mention is made of the uses to which denatured alcohol may be put. For instance, he says it is a safe fuel.

"Although it has only about half the heating power of kerosene or gasolene, gallon for gallon, yet it has many valuable properties which may enable it to compete successfully, in spite of its lower fuel value. In the first place, it is very much safer. Alcohol has a tendency to simply heat the surrounding vapours and produce currents of hot gases which are not usually brought to high enough temperature to inflame articles at a distance. It can be easily diluted with water, and when so diluted, no more than one-half, it ceases to be inflammable. Hence it may readily be extinguished, while burning gasolene, by floating on the water, simply spreads its flame when water is applied to it.

"When alcohol is used for lighting purposes, the general estimate of its value gives it about double the power of kerosene, a gallon of alcohol lasting as long as 2 gallons of the oil. When used for street lighting, alcohol vapour burns like gas with an incandescent flame in a hooded flame covered by a Welsbach mantle. This light rivals the arc light in brilliancy, and requires to be shaded to adapt it to the endurance of the human eye. Alcohol can also be employed in the same manner as gas in cooking stoves."

Mr. J. C. Brünnich, Agricultural Chemist, writing on Neglected Industries, dilated on the shortage of methylated spirit in Brisbane. The following notes on his article were published in our original article on Denatured Alcohol in the *Queensland Agricultural Journal* in July, 1916, but they are well worth repeating, as they have been in the "Journal of the Jamaica Agricultural Society" (vol. xxi., January, 1917):—

He said, he was unable to understand why we did not make good the shortage by manufacture from other materials such as maize, of which the Atherton district at present had a record crop. A bushel of maize (56 lb.) would yield about 5 U.S. gallons of proof spirit, or 2½ gallons of absolute alcohol. One gallon of molasses would yield about four-tenths of a gallon of alcohol. One bushel of sweet potatoes (54 lb.) would give about half a gallon of absolute alcohol, and ordinary potatoes might be expected to give a similar quantity.

Mr. Brünnich said that another excellent article very largely used in America was cassava (arrowroot), which was known to yield very heavy crops in some parts of Queensland, and this would give about the same amount of alcohol as sweet potatoes.

The Agricultural Chemist pointed out that alcohol could be used for driving gas engines for ordinary running, but it had not been found suitable for running motor-cars, as it had not the flexibility of petrol, such as

is required for frequent starting, and running at slow speed. The difficulty was reported to have been overcome in Germany by the addition of a certain amount of benzol (benzene), which was a by-product of coal distillation, and which could be produced in this country. Alcohol, however, could be used in certain classes of lamps, and it was one of the cheapest of fuels and sources of light.

A secondary product of alcohol was acetic acid, which was also in very short supply. Mr. Brünnich suggested spoiled pineapples and apples as sources of supply. In connection with the latter crop, visitors to Southern States had said that the waste of apples owing to difficulties of transport was extraordinary.

Mr. Brünnich expressed the opinion that little or no kerosene should be imported into Australia; it could be largely, if not entirely, replaced by the production of our own alcohol. He pointed out that there were numerous other products which could be produced in Australia at a profit at present prices—even if not profitable to produce under normal conditions.

TO WATERPROOF CLOTHING.

Clothing of unbleached calico may be waterproofed by soaking the material in hot water and hanging it out to dry. Then take as much boiled oil as is necessary, and mix enough lampblack with it to blacken it. For yellow coats, use ground yellow ochre instead. Then lay the fabric on a smooth surface, and put the oil on with a paint brush. Let the first coat get dry before applying another. Lay the oil on as thin as possible. A little gold size will make it dry quicker, say half a pound to 1 gallon of oil. Three coats of oil are usually given. If the last coat remains sticky after it is dry, take 1 lb. shellac and simmer gently with 2 quarts water, and, when near boiling, add a little liquid ammonia. If for a black coat, add a little lampblack to it when cold, and apply it to the coat with a sponge.

PRICKLY-PEAR JELLY.

Rub off the spines very carefully with a thick cloth. Cut the fruit in half, and for every pound allow a pound of water. Boil till the fruit is almost a pulp. Strain away the liquid, and for every pint add the juice of a lemon and a pound of sugar. Simmer gently, removing any scum, until the syrup jellies. Cover down with parchment paper and store for future use. Jelly-making is more suitable for this fruit than jam-making, although the latter can be made by cutting the fruit in half, and then into small pieces, allowing pound for pound of sugar and fruit with very little water in the bottom of the pan, or the colour, like Rosella jam or jelly, would be easily spoiled.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR APRIL, 1917.

Article.		APRIL. Prices.
Bacon	lb.	9d. to 1s.
Barley	bush.	3s. to 4s.
Bran	ton	£5
Broom Millet	,,	£22 to £24
Butter	cwt.	149s. 4d.
Chaff, Mixed	ton	£3 10s. to £4
Chaff, Oaten	,,	£3 5s.
Chaff, Lucerne	,,	£3 10s.
Chaff, Wheaten	,,	...
Cheese	lb.	9½d.
Flour	ton	£12
Hams	lb.	1s. 3d. to 1s. 4d.
Hay, Oaten	ton	£4 10s.
Hay, Lucerne	,,	£2 10s.
Honey	lb.	4½d.
Maize	bush.	2s. 4½d.
Oats	,,	3s. to 4s.
Onions	ton	£7 10s. to £10
Peanuts	lb.	2½d. to 3d.
Pollard	ton	£6 12s. 6d.
Potatoes	,,	£7 15s. to £8 10s.
Potatoes (Sweet)	cwt.	2s. 3d. to 3s. 3d.
Pumpkins (Cattle)	ton	£3 to £3 5s.
Eggs	doz.	1s. 2d. to 2s. 3d.
Fowls	pair	4s. to 6s. 7d.
Ducks, English	,,	3s. 6d. to 4s.
Ducks, Muscovy	,,	4s. 4d. to 7s. 6d.
Geese	,,	6s. 9d.
Turkeys (Hens)	,,	7s. to 8s. 6d.
Turkeys (Gobblers)	,,	13s. to 15s.
Wheat	bush.	3s. 9d.

VEGETABLES—TURBOT STREET MARKETS.

Asparagus, per bundle	...
Cabbages, per dozen	4s. 6d. to 10s.
Cauliflowers, per dozen	...
Celery, per bundle	...
Cucumbers, per dozen	9d. to 1s.
Beans, per sugar bag	3s. 6d. to 6s.
Peas, per sugar bag	4s. to 7s. 6d.
Carrots, per dozen bunches	10d. to 1s.
Chocos, per quarter-case	1s. 3d. to 2s.
Beetroot, per dozen bunches	...
Marrows, per dozen	2s. 6d. to 4s. 6d.
Lettuce, per dozen	1s. to 2s.
Parsnips, per bundle	6d. to 8d.
Sweet Potatoes, per sugar bag	1s. 3d. to 1s. 6d.
Table Pumpkins, per dozen	2s. to 4s.
Tomatoes, per quarter-case	4s. to 7s.
Vegetable Marrows, per dozen	...
Turnips, per dozen bunches	10d. to 1s.
Rhubarb, per dozen bundles	...

SOUTHERN FRUIT MARKETS.

Article.	APRIL. Prices.
Bananas (Queensland), per case	6s. to 12s.
Bananas (Fiji), per case	12s. to 14s.
Bananas (G.M.), per case	13s. 6d. to 16s.
Custard Apples, per 12 to 15 tray	3s. 6d. to 5s. 6d.
Lemons (Local), per bushel-case	2s. to 5s.
Mandarins, per case	5s. to 8s.
Oranges (Navel), per case	10s. to 15s.
Oranges (other), per case	5s. to 8s.
Papaw Apples, per half-bushel-case	7s. to 9s.
Passion Fruit, per half-case	1s. 6d. to 6s. 6d.
Persimmons, per half-case	1s. 6d. to 3s. 6d.
Pineapples (Queens), per double-case	6s. to 8s.
Pineapples (Ripleys), per double-case	5s. to 7s.
Pineapples (Common), per double-case	4s. to 6s.
Tomatoes (Queensland), per half-bushel-case	1s. 6d. to 3s. 6d.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	APRIL. Prices.
Apples, Eating, per case	7s. 6d. to 10s.
Apples, Cooking, per case	6s. to 8s.
Bananas (Cavendish), per dozen	1½d. to 3d.
Bananas (Sugar), per dozen	2½d. to 3½d.
Citrons, per hundredweight	9s. to 10s.
Cocoanuts, per sack	12s. to 15s.
Cumquats, per quarter-case	3s. 6d. to 4s. 9d.
Custard Apples, per quarter-case	3s. to 5s.
Granadillas, per quarter-case	...
Grapes, per lb.	5d. to 6d.
Lemons (Lisbon), per quarter-case	4s. to 7s. 6d.
Limes, per quarter-case	3s. to 4s. 6d.
Mandarins	4s. to 5s.
Nectarines, per quarter-case	1s. to 3s.
Oranges (Navel), per case	9s. to 10s.
Oranges (other), per case	4s. to 6s.
Papaw Apples, per case	2s. to 3s.
Passion Fruit, per quarter-case	3s. to 4s.
Peaches, per quarter-case	1s. 3d. to 3s. 6d.
Pears, per quarter-case	4s. 6d. to 5s. 6¼d.
Peanuts, per lb.	2d. to 4d.
Persimmons, per quarter-case	4s. to 5s.
Plums, per quarter-case	4s. to 5s.
Plums (prime eating), per case	...
Pineapples (Ripleys), per dozen	1s. 6d. to 3s. 6d.
Pineapples (Rough), per dozen	2s. 6d. to 5s.
Pineapples (Smooth), per dozen	1s. 9d. to 5s.
Quinces, per quarter-case	3s.
Rosellas, per sugar bag	2s. to 3s.
Tomatoes, per quarter-case	2s. 6d. to 5s. 3d.
Watermelons, per dozen	...

TOP PRICES, ENOGGERA YARDS, MARCH, 1917.

Animal.	MARCH. Prices.
Bullocks	£19 10s. to £25 5s.
Bullocks (Single)	...
Cows	£11 10s. to £14 17s. 6d.
Merino Wethers	42s. 6d.
Crossbred Wethers	44s. 6d.
Merino Ewes	30s. 9d.
Crossbred Ewes	44s. 6d.
Lambs	40s.
Pigs (Stores)	30s.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MARCH IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING MARCH, 1917 AND 1916, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Mar.	No. of Years' Records.	Mar., 1917.	Mar., 1916.		Mar.	No. of Years' Records.	Mar., 1917.	Mar., 1916.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	9·19	15	6·59	3·76					
Cairns	19·25	34	11·66	5·74	Nambour	10·15	20	9·12	5·21
Cardwell	16·98	44	12·35	6·34	Nanango	3·46	34	3·10	2·19
Cooktown	15·39	40	11·13	16·11	Rockhampton	5·35	29	8·57	3·25
Herberton	8·54	29	9·98	3·67	Woodford	8·87	29	5·78	2·08
Ingham	16·69	24	13·44	13·81					
Innisfail	26·58	35	16·34	15·33					
Mossman	16·87	4	24·25	6·10	*Darling Downs.*				
Townsville	8·36	45	9·31	7·06					
					Dalby	2·89	46	2·57	4·37
					Emu Vale	2·95	20	0·96	1·30
Central Coast.					Jimbour	2·79	28	2·35	3·43
					Miles	2·85	31	5·09	4·54
Ayr	8·19	29	4·91	4·02	Stanthorpe	2·88	43	1·04	1·28
Bowen	6·27	45	6·27	0·58	Toowoomba	4·07	44	3·42	2·35
Charters Towers	3·79	34	3·70	2·75	Warwick	3·11	29	0·88	1·18
Mackay	12·88	45	16·91	4·64					
Proserpine	13·90	13	13·10	3·77					
St. Lawrence	6·43	45	8·90	1·87	*Maranoa.*				
					Roma	3·00	42	3·57	2·80
South Coast.									
					State Farms, &c.				
Biggenden	4·76	17	4·64	2·27					
Bundaberg	5·73	33	10·71	3·26					
Brisbane	5·97	66	2·79	1·38	Bungeworgorai	2·39	4	3·96	1·61
Childers	5·61	21	6·63	2·19	Gatton College	3·84	17	2·97	2·12
Crohamhurst	12·30	25	8·71	3·06	Gindie	2·98	17	10·65	1·34
Esk	5·16	29	4·02	3·27	Hermitage	3·16	10	0·80	1·56
Gayndah	3·37	45	2·22	1·40	Kairi	5·12	4	6·01	2·25
Gympie	6·61	46	4·05	3·87	Kamerunga	18·00	26	8·81	5·15
Glasshouse M'tains	10·19	8	8·64	2·00	Sugar Experiment Station, Mackay	12·95	19	11·25	3·48
Kilkivan	4·28	37	2·92	3·28	Warren	3·16	4	5·49	2·84
Maryborough	6·67	45	6·04	3·48					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for March this year and for the same period of 1916, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, Divisional Officer.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET AT BRISBANE AND THE PHASES OF THE MOON

1917.	MAY.		JUNE.		JULY.		AUGUST.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·13	5·17	6·32	4·59	6·40	5·4	6·30	5·18
2	6·13	5·16	6·32	4·59	6·40	5·4	6·30	5·18
3	6·14	5·15	6·33	4·59	6·40	5·4	6·29	5·19
4	6·15	5·14	6·33	4·59	6·40	5·5	6·29	5·19
5	6·15	5·14	6·33	4·59	6·40	5·5	6·28	5·20
6	6·16	5·13	6·34	4·59	6·40	5·5	6·28	5·20
7	6·15	5·12	6·34	4·59	6·40	5·6	6·27	5·21
8	6·17	5·12	6·34	4·59	6·40	5·6	6·26	5·21
9	6·17	5·11	6·35	4·59	6·40	5·6	6 25	5·22
10	6·18	5·11	6·35	4·59	6·39	5·7	6·24	5·22
11	6·19	5·10	6·35	5·0	6·39	5·7	6·23	5·23
12	6·20	5·9	6·36	5·0	6·39	5·8	6·22	5·23
13	6·21	5·9	6·36	5·0	6·39	5·8	6·21	5·24
14	6·21	5·8	6·36	5·0	6·39	5·9	6·20	5·24
15	6·22	5·8	6·36	5·0	6·38	5·9	6·19	5·25
16	6·23	5·7	6·37	5·0	6·38	5·10	6·18	5·25
17	6·23	5·7	6·37	5·0	6·38	5·10	6·17	5·26
18	6·24	5·6	6·37	5·0	6·37	5·11	6·16	5·27
19	6·24	5·6	6·37	5·0	6·37	5·11	6·15	5·27
20	6·25	5·5	6·38	5·0	6·36	5·12	6·14	5·28
21	6·25	5·5	6·38	5·1	6·36	5·12	6·13	5·28
22	6·26	5·4	6·38	5·1	6·35	5·13	6·12	5·29
23	6·27	5·3	6·38	5·1	6·35	5·13	6·11	5·29
24	6·27	5·3	6·38	5·1	6·34	5·14	6·10	5·30
25	6·28	5·2	6·39	5·2	6·34	5·14	6·9	5·30
26	6·29	5·2	6·39	5·2	6·33	5·15	6·8	5·31
27	6·29	5·1	6·39	5·2	6·33	5·15	6·7	5·31
28	6·30	5·1	6·39	5·3	6·32	5·16	6·6	5·32
29	6·30	5·0	6·39	5·3	6·32	5·16	6·5	5·32
30	6·31	5·0	6·39	5·3	6·31	5·17	6·4	5·33
31	6·31	4·59	...	...	6·31	5·17	6·3	6·33

The times given are for the whole of Queensland, New South Wales, and Victoria, where the same Standard Time is observed.

			H.	M.	
7 May	○	Full Moon	12	43	p.m.
14 „	☽	Last Quarter	11	48	a.m.
21 „	●	New Moon	10	47	„
29 „	☾	First Quarter	9	33	„

The Moon will be nearest the earth on the 14th, and at its farthest distance on the 28th.

5 June	○	Full Moon	11	7	p.m.
12 „	☽	Last Quarter	4	38	„
19 „	●	New Moon	11	2	„
28 „	☾	First Quarter	2	8	a.m.

The Moon will be nearest the earth on the 9th, and at its farthest distance on the 25th. It will cause a partial Eclipse of the Sun on the 19th, visible in the Arctic Regions but not in Australia.

5 July	○	Full Moon	7	40	a.m.
11 „	☽	Last Quarter	10	12	p.m.
19 „	●	New Moon	1	0	„
27 „	☾	First Quarter	4	40	„

The moon will be nearest the earth on the 7th, and at its greatest distance on the 22nd. There will be a *Total Eclipse* of the *Moon* from 6·51 to 8·27 a.m. on the 5th; but only the moon's entrance into the shadow of the earth will be seen in Eastern Australia.

3 Aug.	○	Full Moon	3	11	p.m.
10 „	☽	Last Quarter	5	56	a.m.
18 „	●	New Moon	4	21	„
26 „	☾	First Quarter	5	8	„

The moon will be nearest the earth on the 4th, and at its greatest distance on the 18th.

* For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise and sunset are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during May, June, and July, and to the middle of August may be roughly arrived at by adding 20 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

* These notes will not again be published until September, as they apply to the series from May to August.

Farm and Garden Notes for June.

Field.—Winter begins on the 24th of this month, and frosts will already have been experienced in some of the more exposed districts of the Southern coast and on the Darling Downs. Hence insect pests will, to a great extent, cease from troubling, and weeds will also be no serious drawback to cultivation. The month of June is considered by the most successful lucerne-growers to be the best time to lay down this crop, as any weeds which may spring up in the event of a dropping season will be so slow-growing that the young lucerne plants will not be choked by them.

The land should now be got ready for millets, sorghums, panicum, &c. Oats, barley, vetches, clover, tobacco, buckwheat, field carrots, and Swedes may now be sown. Some advocate the sowing of early maize and potatoes during this month, but obviously this can only apply to the more tropical parts of Queensland. The land may be got ready, but in the Southern districts and on the tableland neither maize nor potatoes should be planted before August or, at the earliest, in warm early districts, at the end of July. There is always almost a certainty of frosts, more or less severe, during these months. Arrowroot will be nearly ready for digging, but we would not advise taking up the bulbs until the frosts of July have occurred. Take up sweet potatoes, yams, and ginger. Should there be a heavy crop, and consequently a glut in the market, sweet potatoes may be kept by storing them in a cool place in dry sand, taking care that they are thoroughly ripe before digging. The ripeness may be known by the milky juice of a broken tuber remaining white when dry. Should the juice turn dark, the potato is unripe, and will rot or dry up and shrivel in the sand pit. Before pitting, spread the tubers out in a dry barn or in the open, if the weather be fine. In pitting them or storing them in hills, lay them on a thick layer of sand; then pour dry sand over them till all the crevices are filled and a layer of sand is formed above them; then put down another layer of tubers, and repeat the process until the hill is of the requisite size. The sand excludes the air, and the potatoes will keep right through the winter. Late wheat may still be sown, but it is too late for a field crop of onions. In tropical Queensland the bulk of the coffee crop should be off by the end of July. Yams may be unearthed. Cuttings of cinnamon and kola-nut tree may be made, the cuttings being planted under bell glasses. Collect divi-divi pods and tobacco leaves. English potatoes may be planted. The opium poppy will now be blooming and forming capsules. Gather tilseed (sesame), and plant out young tobacco plants if the weather be suitable. Sugar-cane cutting may be commenced. Keep the cultivator moving amongst the pineapples. Gather all ripe bananas. Fibre may be produced from the old stems.

KITCHEN GARDEN.—Cabbage, cauliflower, and lettuce may be planted out as they become large enough. Plant asparagus and rhubarb in well-prepared beds in rows. In planting rhubarb it will probably be found more profitable to buy the crowns than to grow them from seed, and the same remark applies to asparagus.

Sow cabbage, red cabbage, peas, lettuce, broad beans, carrots, radish, turnip, beet, leeks, and herbs of various kinds, such as sage, thyme, mint, &c. Eschalots, if ready, may be transplanted; also, horse-radish can be set out now.

The earlier sowings of all root crops should now be ready to thin out if this has not been already attended to.

Keep down the weeds among the growing crops by a free use of the hoe and cultivator.

The weather is generally dry at this time of the year, so the more thorough the cultivation the better for the crops.

Land for early potatoes should now be got ready by well digging or ploughing.

Tomatoes intended to be planted out when the weather gets warmer may be sown towards the end of the month in a frame where the young plants will be protected from frost.

FLOWER GARDEN.—No time is now to be lost, for many kinds of plants need to be planted out early to have the opportunity of rooting and gathering strength in the cool moist spring time to prepare them for the trial of heat they must endure later on. Do not put your labour on poor soil. Raise only the best varieties of plants in the garden; it costs no more to raise good varieties than poor ones. Prune closely all the hybrid perpetual roses; and tie up, without pruning, to trellis or stakes the climbing and tea-scented varieties, if not already done. These and other shrubs may still be planted. See where a new tree or shrub can be planted; get these in position; then they will give you abundance of spring bloom. Renovate and make lawns, and plant all kinds of edging. Finish all pruning. Divide the roots of chrysanthemums, perennial phlox, and all other hardy clumps; and cuttings of all the summer bedding plants may be propagated.

Sow first lot, in small quantities, of hardy and half-hardy annuals, biennials, and perennials, some of which are better raised in boxes and transplanted into the open ground, but many of this class can, however, be successfully raised in the open if the weather is favourable. Antirrhinum, carnation, picotees, dianthus, hollyhock, larkspur, pansy, petunia, *Phlox Drummondi*, stocks, wallflower, and zinnias, &c., may be sown either in boxes or open beds; mignonette is best sown where it is intended to remain.

To grow these plants successfully, it is only necessary to thoroughly dig the ground over to a depth of not less than 12 in., and incorporate with it a good dressing of well-decayed manure, which is most effectively done by a second digging; the surface should then be raked over smoothly,

so as to remove all stones and clods, thus reducing it to a fine tilth. The seed can then be sown in lines or patches as desired, the greatest care being taken not to cover deeply; a covering of not more than three times the diameter of larger seeds, and a light sprinkling of fine soil over small seeds, being all that is necessary. A slight mulching of well-decayed manure and a watering with a fine-rosed can will complete the operation. If the weather prove favourable, the young seedlings will usually make their appearance in a week or ten days; thin out so as to leave each plant (if in the border) at least 4 to 6 in. apart.

Orchard Notes for June.

THE SOUTHERN COAST DISTRICTS.

The Notes of last month, referring to the care to be taken in the handling and marketing of all kinds of citrus fruits, apply with equal force during this and subsequent months till the end of the season.

Keep the orchard clean, and work the land to retain moisture. The handling of the citrus crop is the main work in many orchards, but where slowly acting manures are to be given their application should not be later than this month. They should be well mixed with the soil, so that when Spring comes and the trees start a fresh growth a certain percentage of plant food will be available for the trees' use. Heavy pruning should be done now, whilst the trees are dormant. All large limbs should be cut off close to the main stem; the edges of the cuts should be carefully trimmed, and the whole wound, if of large size, covered with paint or grafting wax, so that it will not start to decay but soon grow over. When the soil of the orchard is becoming deficient in organic matter, the growing of a Winter green crop, such as mustard or rape, is well worth a trial. Clear the crop of fruit from the part of the orchard to be so treated. Plough the land well; work the soil down fine so as to get a good seed bed, and broadcast the mustard or rape. A manuring of 4 cwt. of meatworks manure and 1 cwt. of sulphate of potash per acre will produce a very heavy crop of green manure, and the plant food not required for the production of such crop will be still available for the trees' use in Spring.

Pineapples and bananas should all be cleaned up, and the land got into first-class order. Pineapples, where at all liable to frost, should be covered with grass or other suitable material. The growth of weeds between the rows of pines on land liable to frost is one of the best ways of encouraging frost, as frost will strike dirty, weedy ground, and severely injure the pines growing thereon, when it will do little, if any, damage where the land is kept perfectly clean—another advantage of cleanliness in cultivation.

THE TROPICAL COAST DISTRICTS.

Keep the land well cultivated—plough when necessary to bury weed growth, and get the surface of the ground into a state of thorough tilth, as moisture must be retained in the soil by cultivation to mature the Spring Crop of fruit. This applies not only to oranges and other tree fruits, but to bananas and pines as well. A good start in Spring means good bunches of bananas and early-ripening pineapples. Heavy pruning can be done now in the case of all trees not carrying a heavy crop of fruit; but where citrus trees are heavily loaded, the pruning should be put off till after the Spring crop of fruit has been gathered. The spraying of the trunks and inside of the trees with the lime and sulphur wash can be carried out, and where Maori is making its appearance the sulphide of soda wash should be used as well.

THE SOUTHERN AND CENTRAL TABLELANDS.

The pruning of all kinds of deciduous fruit trees is the chief work of the month in the Stanthorpe district. Do not be frightened to prune severely—first, in the case of young trees, so as to get strong well-grown trees instead of straggling top-heavy trees; and, second, in the case of trees that are going off in the size and quality of their fruit. Where peaches, apricots, plums, or nectarines are only making very little growth, and that weak, so that the fruit produced thereon is small, it is advisable to head the tree hard back, so that it will throw out some vigorous branches in Spring that will form a new head for the tree. Apples, as well as plums and apricots, are sometimes inclined to over-produce fruit spurs, which become long and straggling, and bear a large quantity of small-size fruit. A vigorous shortening back and cutting out of such spurs will have a very beneficial effect in the quality and size of the fruit produced.

Gather and burn all prunings; and where codlin moth is present in the orchard, examine the tree carefully when pruning it, so as to see if there are any cracks, crevices, or masses of loose bark in or under which the larvæ of the moth may be hibernating. All larvæ so found should be destroyed, and if the work is carried out systematically it will tend to materially decrease the crop of moths that will hatch out the following Spring.

As soon as any part of the orchard is pruned, gather up the prunings and work the land, as a thorough winter weathering of the soil is very beneficial in its effects; and, further, it will tend to destroy many insects that may be wintering in it. The planting of new orchards or of trees to replace any that may have died, or that have been proved to be unsuitable to the district, may be continued during the month, and right on till the end of Winter.

Do not prune vines in the Stanthorpe district, as it is advisable to leave the pruning as late as possible, but vine-pruning can be done at any time now in the Roma or Central districts. Tree-pruning can be continued during the month, and the orchard should be kept well worked. Citrus fruits can be marketed. Lemons should be gathered and cured.

SUGAR NOTES FROM CAIRNS.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report upon the Cairns district from Mr. D. Macdonald, Field Assistant to the Bureau:—

HAMBLEDON AND MULGRAVE.

The plant cane is looking well, but ratoons are backward owing to late cutting.

Grubs are doing damage, especially at Greenhills.

In places leaf stripe disease is in evidence, and farmers were advised how to combat it.

Meatworks manure, at the rate of 6 cwt. per acre, is applied by machine—(1) in the seedbed; (1) when cane about 1 ft. high; and (3) on ratoons immediately after ploughing away. Nitrate of soda is used to a lesser extent, and almost entirely confined to ratoons.

Green manuring is observed, but there has been much dissatisfaction amongst growers on account of Mauritius Bean seed failing to germinate. For this reason, growers prefer the pea, but this is almost unobtainable.

The canes chiefly grown are Badila and D. 1135. The latter is drilled 4 ft. 6 in. apart, and Badila 5 ft. The area under D. 1135 is on the increase.

Lime, where used, has proved most beneficial, and at Gordonvale is quoted at 58s. 6d. per ton. On the Mulgrave there is an exceedingly fine crop of Badila, especially on the Munro Estate.

Mr. Bastin's farm is a striking example of what can be done by good methods of husbandry. The area is small and the land not of the best, yet the crops are good, clean, and healthy.

BABINDA.

The soils are varied in colour and quality, ranging from red volcanic to brown alluvial.

Much of the area now under cane, more particularly that adjacent to the mill, is of a granitic nature. This soil at present produces good

crops, but if cane-growing on these lands is to be a commercial success it will be necessary for growers, as soon as the land is stumped, to go in extensively for green manuring.

The country contiguous to the Russell River is of excellent quality, and the crops thereon are truly magnificent.

As the land is almost entirely virgin, little manuring is done, but in some instances late-cut ratoons have had a dressing of nitrate of soda at the rate of 1 cwt. per acre.

On the older lands grubs are doing some damage.

The varieties grown are Badila and Goru, of which fully 95 per cent. is of the former cane. The average tonnage for last year, when there was 75 per cent. plant cane, was 40 tons per acre.

The cost of putting scrub land under cane varies considerably on account of the nature of the timber and the rains experienced subsequent to falling and prior to burning. The most expensive land to tackle is that timbered with Johnston hardwood, the least expensive being vine scrub.

In addition to clearing, there is the cost of plants, planting, and chipping. From the time of planting until the crop is out of hand, chipping costs amount to about £8 per acre. To facilitate the laying of tramline for harvesting, it is customary to clear strips of land sufficiently wide every 2 chains.

The mill is busily engaged in hauling firewood to meet the needs of the coming crushing. The overhaul of the machinery is proceeding apace, and the season will commence about the 23rd of May. There is plenty of labour offering.

The most persistent weeds are Natal grass and a grass known locally as "Johnstone River grass." The latter grass is particularly troublesome, as it roots from every joint. This grass forms the bulk of the pasturage, and apparently is nutritious and much relished by stock of all classes.